This document gives pertinent information concerning the reissuance of the VPDES Permit listed below. This permit is being processed as a Minor, Municipal permit. The discharge results from the operation of a 0.8 MGD wastewater treatment plant. This permit action consists of updating the proposed effluent limits to reflect the current Virginia WQS (effective January 6, 2011) and updating permit language as appropriate. The effluent limitations and special conditions contained in this permit will maintain the Water Quality Standards of 9VAC25-260 et seq.

1.	Facility Name and Mailing Address:	Louisa Regional STP P.O. Box 9 Louisa, VA 23093	SIC Code :	4952 WWTP
	Facility Location:	131 Pine Ridge Drive Louisa, VA 23093	County:	Louisa
	Facility Contact Name:	Randy Gray, Chief Wastewater Operator	Telephone Number:	540-967-7857
	Facility E-mail Address:	rgray@louisa.org		
2.	Permit No.:	VA0067954	Expiration Date of previous permit:	12/3/2014
	Other VPDES Permits associated with this facility:		VAN030154 (Nutrient GP)	
	Other Permits associated with this facility:		VPA00074 (Biosolids Use)	
	E2/E3/E4 Status:	NA		
3.	Owner Name:	Town of Louisa and County of Louisa		
	Owner Contact/Title:	Pam Baughman, General Manager	Telephone Number:	540-967-1122
	Owner E-mail Address:	pbaughman@louisa.org		
4.	Application Complete Date:	6/18/2014		
	Permit Drafted By:	Anna Westernik	Date Drafted:	7/17/2015
	Draft Permit Reviewed By:	Doug Frasier	Date Reviewed:	7/20/2015
	WPM Review By:	Alison Thompson	Date Reviewed:	8/4/2015
	Public Comment Period :	Start Date: 10/29/2015	End Date:	11/30/2015

5. Receiving Waters Information: See **Attachment 1** for the Flow Frequency Determination
The High Flow Months are November through April

Receiving Stream Name :	Beaver Creek	Stream Code:	8-BVR
Drainage Area at Outfall:	0.57 sq. mi.	River Mile:	7.5 *
Stream Basin:	York	Subbasin:	York
Section:	3	Stream Class:	III
Special Standards:	None	Waterbody ID:	VAN-F02R
7Q10 Low Flow:	0.003 MGD	7Q10 High Flow:	0.055 MGD
1Q10 Low Flow:	0.003 MGD	1Q10 High Flow:	0.043 MGD
30Q10 Low Flow:	0.008 MGD	30Q10 High Flow:	0.080 MGD
Harmonic Mean Flow:	0.060 MGD	30Q5 Flow:	0.14 MGD

* The rivermile measurement has been revised based on methodology to thoroughly incorporate the meanderings of the receiving stream.

6. Statutory or Regulatory Basis for Special Conditions and Effluent Limitations:

X	State Water Control Law	X	EPA Guidelines
X	Clean Water Act	X	Water Quality Standards
X	VPDES Permit Regulation		Other
X	EPA NPDES Regulation	X	9VAC25-40 (Nutrient Regulation)

7. Licensed Operator Requirements: Class II

8. Reliability Class: Class I

9. Permit Characterization:

	Private	X	Effluent Limited		Possible Interstate Effect
	Federal	X	Water Quality Limited		Compliance Schedule Required
	State	X	Whole Effluent Toxicity Program Required		Interim Limits in Permit
X	POTW	X	Pretreatment Program Required		Interim Limits in Other Document
X	TMDL	X	e-DMR Participant		

10. Wastewater Sources and Treatment Description:

The portion of the Town of Louisa collection system that drains to this facility consists of approximately 20,000 linear feet of 15, 10, 8, and 6 inch sewer lines and the associated manholes. The Town of Mineral collection system that drains to this facility consists of approximately 16,000 linear feet of 8 inch sewer lines, 3,000 linear feet of 6 inch sewer lines, and 60 manholes. The County of Louisa collection system that drains to this facility consists of approximately 20,000 linear feet of 15, 10, 8, and 6 inch sewer lines and the associated manholes. The sewage is a mixture of domestic, commercial, and industrial sources.

Wastewater from the collection system enters the plant through two influent pump wet wells and is pumped to the mechanical cylindrical fine screen channel to remove the large solids materials. Following the screening, the wastewater enters an aerated grit collection system to remove smaller non-organic solids from the wastestream. The wastewater then enters the anaerobic/anoxic basins where it is mixed with the biomass to begin the process of biological phosphorus removal and denitrification. The anaerobic basins are devoid of oxygen and nitrate, which provides favorable conditions for biological phosphorus removal (combined with a downstream aerobic zone). Anoxic basins are devoid of oxygen but contain nitrate that is provided by the nitrate rich stream pumped by the internal recycle pump station from the oxidation ditch (after nitrification). This environment allows for biological reduction of nitrate to nitrogen gas.

The effluent from the anaerobic/anoxic basin is routed to Oxidation Ditch Number 1, where it is aerated for a given period of time to achieve nitrification and BOD reduction. The wastewater is then transported to Oxidation Ditch Number 2 for further nitrification/BOD removal. The internal recycle pump station pulls nitrate rich mixed liquor from Oxidation Ditch Number 2. Combined biomass and water (mixed liquor) flows from the aeration channels, into the flow splitters, and then to the clarifiers for separation. In the clarifiers, biomass is allowed to settle from the mixed liquor. The clarified effluent flows from the clarifiers to cloth media filters where additional solids are removed. The flow then enters the ultraviolet (UV) light disinfection unit. The final stage of treatment is cascade aeration to raise the dissolved oxygen (D.O.) level to match that of the receiving stream before discharging to Beaver Creek.

A Certificate to Operate (CTO) was issued for the 0.8-MGD sewage treatment plant on November 18, 2014 (see **Attachment 2**).

See **Attachment 3** for a facility schematic/diagram.

TABLE 1 – Outfall Description				
Outfall Number	**Discharge Sources**	**Treatment**	**Design Flow(s)**	**Outfall Latitude and Longitude**
001	Domestic and/or Commercial Wastewater	See Item 10 above.	0.8MGD	**38° 00' 30"** N **77° 59' 38"** W
See **Attachment 4** for the Mineral Topographic Map (DEQ #171C).				

11. Sludge Treatment and Disposal Methods:

Two aerobic digesters are used at this facility for sludge stabilization. The stabilized biosolids are periodically dewatered via a belt filter press prior to disposal by land application or a landfill. Land application is conducted by the Louisa County Water Authority in accordance with the Louisa Regional WWTP Sludge Management Plan and a Department of Environment Quality (DEQ) permit authorizing land disposal of biosolids and water treatment plant residuals by the Louisa County Water Authority (VPA00074).

12. Discharges in Waterbody VAN-F02R

TABLE 2 -- Other Dischargers Within Waterbody VAN-F02R			
Individual VPDES Permits Discharging to Waterbody VAN-F02R			
Description	**Type**	**Latitude/ Longitude**	**River Mile**
VA0088421 – Twin Oaks Community STP	0.01 MGD Municipal Wastewater Discharge	37° 55' 56" 77° 59' 39"	0.5 Polecat Creek
VA0058891 – Northeast Creek WTP	0.05 MGD Industrial Wastewater Discharge	37° 58' 36" 77° 56' 27"	3.83 Northeast Creek
VA0076678 -- Shenandoah Crossing STP	0.1 MGD Municipal Wastewater Discharge	38° 04' 32" 78° 08' 57"	0.54 Lickinghole Creek

General Permits Discharging to Waterbody VAN-F02R		
Single Family Homes		
Permit Number	**Facility Name**	**Receiving Stream**
VAG406457	Crickenberger, Stephanie Residence	Harris Creek, UT
VAG406402	Wanda Dove Residence	Fosters Creek, UT
VAG406492	Keenan Michael Residence	Reedy Creek
VAG406527	CFS Resources, LLC	Fosters Creek, UT
VAG406491	Thomas D. Thompson Property	South Anna River, UT
VAG406370	William A Cooke Inc - Residence	Beaver Creek, UT
VAG406462	Barrett Grove Subdivision Lot 10	Harris Creek, UT
VAG406501	Samuel and Leslie Jordon Residence	Desper Creek
VAG406463	Joy Henson Residence	Harris Creek, UT
VAG406464	Barrett Grove Subdivision Lot 20	Harris Creek, UT
Storm Water Industrial		
Permit Number	**Facility Name**	**Receiving Stream**
VAR051660	Louisa County Airport (Freeman Field)	Northeast Creek, UT/Beaver Creek, UT
VAR052063	C3 Holdings Limited Liability Company	Beaver Creek, UT
Petroleum		
Permit Number	**Permit Number**	**Permit Number**
VAG830482	Louisa Boat Motor Sales and Service	Tanyard Branch, UT

13. Material Storage:

Table 3 - Material Storage		
Materials Description	**Volume Stored**	**Spill/Stormwater Prevention Measures***
Soda Ash	50, 50-lb. Bags (2,500 lbs.)	Stored Indoors
Alum	10, 55-Gallon Drums	Stored on Pad; Overflow Cleaned by Spill Kit
Extera 7787 Polymer	250-Gallon Tote	Secondary Containment
*The Authority is in the process of constructing a Septage Receiving/Chemical Storage and Feed Building.		

14. Site Inspection:

A site inspection was performed by Anna Westernik on March 31, 2015 (see **Attachment 5**).

15. Receiving Stream Water Quality and Water Quality Standards:

a. Ambient Water Quality Data

This facility discharges into Beaver Creek. DEQ ambient monitoring station 8-BVR005.57 is located directly upstream from Outfall 001; however, it was monitored only once (during 1998) and this Beaver Creek segment has not been assessed since 2002.

The closest downstream DEQ monitoring station is 8-SAR068.57, located approximately 9.50 miles downstream from Outfall 001. This station is a DEQ ambient trend monitoring station on the South Anna River at the Route 605 bridge crossing. The following is the summary for this portion of the South Anna River, as taken from the 2012 Integrated Report:

Class III, Section 3.

DEQ monitoring stations located in this segment of the South Anna River:

- Ambient trend monitoring station 8-SAR068.57, at Route 605.

The aquatic life use is considered fully supporting. *E. coli* monitoring finds a bacterial impairment, resulting in an impaired classification for the recreation use. This impairment is nested within the downstream completed bacteria TMDL for the Pamunkey River. The fish consumption use was not assessed. The wildlife use is considered fully supporting.

b. 303(d) Listed Stream Segments and Total Maximum Daily Loads (TMDLs)

Table 4 – 2012 Downstream Impairment Information							
Waterbody Name	**Impaired Use**	**Cause**	**Distance From Outfall**	**TMDL completed**	**WLA**	**Basis for WLA**	**TMDL Schedule**
Impairment Information in the 2012 Integrated Report							
South Anna River	Recreation	*E. coli*	9.30 miles	Pamunkey River Basin Bacteria 8/2/2006	1.39E+12 cfu/year *E. coli*	126 cfu/100 ml *E. coli* --- 0.8 MGD	---

Significant portions of the Chesapeake Bay and its tributaries are listed as impaired on Virginia's 303(d) list of impaired waters for not meeting the aquatic life use support goal, and the 2012 Virginia Water Quality Assessment 305(b)/303(d) Integrated Report indicates that much of the mainstem Bay does not fully support this use support goal under Virginia's Water Quality Assessment guidelines. Nutrient enrichment is cited as one of the primary causes of impairment. EPA issued the Bay TMDL on December 29, 2010. It was based, in part, on the Watershed Implementation Plans developed by the Bay watershed states and the District of Columbia.

The Chesapeake Bay TMDL addresses all segments of the Bay and its tidal tributaries that are on the impaired waters list. As with all TMDLs, a maximum aggregate watershed pollutant loading necessary to achieve the Chesapeake Bay's water quality standards has been identified. This aggregate watershed loading is divided among the Bay states and their major tributary basins, as well as by major source categories (wastewater, urban storm water, onsite/septic agriculture, air deposition). Part

17.e of this fact sheet provides additional information on specific nutrient limitations for this facility to implement the provisions of the Chesapeake Bay TMDL.

The full planning statement is found in **Attachment 6**.

c. Receiving Stream Water Quality Criteria
Part IX of 9VAC25-260(360-550) designates classes and special standards applicable to defined Virginia river basins and sections. The receiving stream, Beaver Creek, is located within Section 3 of the York River Basin and is a Class III water.

At all times, Class III waters must achieve a D.O. of 4.0 mg/L or greater, a daily average D.O. of 5.0 mg/L or greater, a temperature that does not exceed 32°C, and maintain a pH of 6.0-9.0 standard units (S.U.).

1) pH and Temperature for Ammonia Criteria:
The fresh water, aquatic life Water Quality Criteria for ammonia are dependent on the instream temperature and pH. Since the effluent may have an impact on the instream values, the temperature and pH values of the effluent must also be considered when determining the ammonia criteria for the receiving stream. The 90th percentile temperature and pH values are used because they best represent the critical conditions of the receiving stream.

The seasonal tiers for this receiving stream are November through March and April through October. Since the instream waste concentration is greater than 99% during critical flow conditions (April through October), it can be assumed that the composition of the receiving stream mirrors the discharge during this time. The calculated 90th percentile effluent pH value for April through October, using bench sheet data derived after the issuance of the November 2014 CTO (April – May 2015) is 7.6 S.U. The calculated 90th percentile effluent pH value for November through March, using data from December 2014 to March 2014 is 7.6 S.U. The pH of the receiving stream at Ambient Monitoring Station 8-SAR068.57 (approximately 9.5 miles downstream of Outfall 001 on the South Anna River) for the period of January 2010 to March 2015 is 7.3 S.U.

No significant differences between the 90th percentile pH values used to calculate ammonia limits in the 2009 reissuance and this reissuance were found. Hence, the 90th percentile pH values used to determine ammonia criteria in the 2009 permit reissuance are being carried forward as part of this permit reissuance. The 90th percentile temperature values were determined to be 23.2° C (April through October) and 13.6 °C (November through March) based upon 2014 effluent data. These values were used to determine ammonia criteria. See **Attachment 7** for the calculation of the 90th percentile pH values for the 2009 reissuance and the 90th percentile pH and temperature values for the 2015 permit reissuance.

2) Total Hardness Derivation for Hardness-Dependent Metals Criteria:
Metals water quality criteria can be dependent on the receiving stream's hardness, the effluent hardness, or a mixture of both. The hardness value used to express metals water quality criteria is expressed as mg/L calcium carbonate. The flow values for Beaver Creek at the proposed discharge location are described in **Attachment 1.** Since the instream waste concentration is greater than 99% during critical flow conditions, it can be assumed that the composition of the receiving stream mirrors the discharge during critical flow periods. Therefore, the hardness-dependent metals water quality criteria in **Attachment 8** were calculated based on an effluent hardness value of 106 mg/L collected on July 3, 2015.

3) Copper Criteria Determined from a Water Effects Ratio (WER) Study:
When this permit was reissued in 2004, it was determined that copper limits were necessary. Monitoring and a Schedule of Compliance were included in the 2004 permit. A Streamlined Copper Water Effects Ratio (WER) Study conducted in 2008 established a Copper WER of 15.70. This resulted in acute copper criterion of 124.9 µg/L and chronic copper criterion of 184.3 µg/L. Use of the revised copper criteria allowed the removal of total recoverable copper monitoring and proposed limits from this permit.

In November 2014, a CTO was issued for the expansion of the sewage treatment plant to 0.8 MGD. Due to the expansion, another streamlined copper WER was conducted for the Louisa Regional WWTP. The study followed EPA guidance for a Streamlined Water Effect Ratio Procedure for the Discharges of Copper (EPA 822-R-01-05). The Final Streamlined WER Report was submitted to DEQ on June 15, 2015. DEQ's Water Quality Standards Staff reviewed the submitted document in June 2015. The Final Streamlined WER Report and the DEQ review memorandum dated June 18, 2015 can be found in **Attachment 9**. The Total Recoverable Copper WER resulting from this study is 6.373. This WER value, the results of effluent copper monitoring conducted in April and May 2015, and a hardness value of 106 mg/L collected in July 2015 was used to determine the need for Total Recoverable Copper limits in this permit reissuance.

A summary of the calculated copper water quality criteria is discussed below.

Per 9VAC25-260-140.F, the formulas for the freshwater acute and chronic criteria (µg/L) for copper utilize a default WER value of 1.0 unless shown otherwise.

Acute Criteria
WER x $[_e\{0.9422[\ln(\text{hardness})]-1.700\}]$ x (CF_a) Where $CF_a = 0.96$

Chronic Criteria
WER x $[_e\{0.8545[\ln(\text{hardness})]-1.702\}]$ x (CF_c) Where $CF_c = 0.96$

Using an average effluent hardness of 106 mg/L and a default WER value of 1.0 (**Attachment 8**). The following acute and chronic copper criteria were calculated.

Acute Criteria	Chronic Criteria
14 µg/L	9.4 µg/L

As discussed, the 2015 WER study established a copper WER value of 6.373. The following acute and chronic copper criteria were derived by use of the following calculation:

6.373 * Acute/Chronic Criteria /0.96

The CF_a and CF_c values were not used in determination of the acute and chronic criteria so that total metals criteria could be calculated.

Acute Criteria	Chronic Criteria
93 µg/L	62 µg/L

4) Bacteria Criteria:
The Virginia Water Quality Standards at 9VAC25-260-170A state that the following criteria shall apply to protect primary recreational uses in surface waters:

E. coli bacteria per 100 ml of water shall not exceed a monthly geometric mean of the following:

	Geometric Mean*
Freshwater *E. coli* (N/100 ml)	126

*For a minimum of four weekly samples taken during any calendar month.

The Freshwater Water Quality/Wasteload Allocation Analysis (**Attachment 8**) incorporates the pH and temperature data discussed above to determine ammonia criteria and the effluent hardness used to determine hardness-based metals criteria. It also details other water quality criteria applicable to the receiving stream.

d. Receiving Stream Special Standards
The State Water Control Board's Water Quality Standards, River Basin Section Tables (9VAC25-260-360, 370 and 380) designates the river basins, sections, classes, and special standards for surface waters of the Commonwealth of Virginia. The receiving stream, Beaver Creek, is located within Section 3 of the York River Basin. This section has not been designated with a special standard. A drinking water intake is located within five miles of Outfall 001; however, the Louisa Regional WWTP does not drain to the waterbody where the intake is located. Therefore, a public water supply special standard is not associated with this permit.

16. Antidegradation (9VAC25-260-30):

All state surface waters are provided one of three levels of antidegradation protection. For Tier 1 or existing use protection,

existing uses of the water body and the water quality to protect these uses must be maintained. Tier 2 water bodies have water quality that is better than the water quality standards. Significant lowering of the water quality of Tier 2 waters is not allowed without an evaluation of the economic and social impacts. Tier 3 water bodies are exceptional waters and are so designated by regulatory amendment. The antidegradation policy prohibits new or expanded discharges into exceptional waters.

The receiving stream has been classified as Tier 1 based on an evaluation of the critical stream flows. The drainage area above the discharge point is 0.57 square miles, and the 7Q10 is 0.003 MGD. During both critical flow and high flow periods, the design flow discharge volume from the sewage treatment plant is much greater than the flow in the stream. It is staff's best professional opinion that the instream waste concentration is almost 100% during critical stream flows, and the water quality of the stream will mirror the quality of the effluent. Permit limits proposed in this reissuance have been established by determining wasteload allocations that will result in attaining and/or maintaining all water quality criteria applicable to the receiving stream, including narrative criteria. These wasteload allocations will provide for the protection and maintenance of all existing uses.

17. Effluent Screening, Wasteload Allocation, and Effluent Limitation Development:

To determine water quality-based effluent limitations for a discharge, the suitability of data must first be determined. Data is suitable for analysis if one or more representative data points are equal to or above the quantification level ("QL") and the data represent the exact pollutant being evaluated.

Next, the appropriate Water Quality Standards (WQS) are determined for the pollutants in the effluent. Then, the Wasteload Allocations (WLAs) are calculated. In this case since the critical flows have been determined to be zero for the April through October period, the WLA values are equal to the WQS. However, for the November through March period, mixing zones are used to determine the WLA values for ammonia. The WLA values are then compared with available effluent data to determine the need for effluent limitations. Effluent limitations are needed if the 97th percentile of the daily effluent concentration values is greater than the acute wasteload allocation or if the 97th percentile of the four-day average effluent concentration values is greater than the chronic wasteload allocation. In the case of ammonia evaluations, limits are needed if the 97th percentile of the thirty-day average effluent concentration values is greater than the chronic WLA. Effluent limitations are based on the most limiting WLA, the required sampling frequency and statistical characteristics of the effluent data.

a. Effluent Screening:

The Discharge Monitoring Report (DMR) review for the period after the issuance of the November 2014 CTO shows no discharge violations.

Staff derived wasteload allocations where parameters are reasonably expected to be present in sewage effluent and where effluent data indicate the pollutant is present in the discharge above quantifiable levels. With regard to the Outfall 001 discharge, ammonia as N is likely present since this is a sewage treatment plant. Additionally, copper and zinc were found in effluent monitoring. **Attachment 8** details the mixing analysis results and WLA derivations for these pollutants. Chloroform was found at a low level (2.03 µg/L) in a March 2014 sampling event. There are no acute or chronic criteria associated with chloroform—only human health criteria. Since the level of chloroform found in the final effluent in 2014 was much lower than the human health criteria of 11,000 µg/L for general surface water discharges found in the 2011 Virginia Water Quality Standards, there is no need to require further monitoring of chloroform.

b. Mixing Zones and Wasteload Allocations (WLAs):
Wasteload allocations (WLAs) are calculated for those parameters in the effluent with the reasonable potential to cause an exceedance of water quality criteria. The basic calculation for establishing a WLA is the steady state complete mix equation:

$$WLA = \frac{Co\,[\,Qe + (\,f\,)(Qs\,)\,] - [\,(\,Cs\,)(\,f\,)(\,Qs\,)\,]}{Qe}$$

Where:
- WLA = Wasteload allocation
- Co = In-stream water quality criteria
- Qe = Design flow
- f = Decimal fraction of critical flow from mixing evaluation
- Qs = Critical receiving stream flow (1Q10 for acute aquatic life criteria; 7Q10 for chronic aquatic life criteria; 30Q10 for ammonia criteria; harmonic mean for carcinogen-human health criteria; and 30Q5 for non-carcinogen human health criteria)
- Cs = Mean background concentration of parameter in the receiving stream.

The Water Quality Standards contain two distinct mixing zone requirements. The first requirement is general in nature and requires the "use of mixing zone concepts in evaluating permit limits for acute and chronic standards in 9VAC25-260-140.B". The second requirement is specific and establishes special restrictions for regulatory mixing zones "established by the Board".

The Department of Environmental Quality uses a simplified mixing model to estimate the amount of mixing of a discharge with the receiving stream within specified acute and chronic exposure periods. The simplified model contains the following assumptions and approximations:

- The effluent enters the stream from the bank, either via a pipe, channel or ditch.
- The effluent velocity isn't significantly greater (no more than 1 - 2 ft/sec greater) than the stream velocity.
- The receiving stream is much wider than its depth (width at least ten times the depth).
- Diffusive mixing in the longitudinal direction (lengthwise) is insignificant compared with advective transport (flow).
- Complete vertical mixing occurs instantaneously at the discharge point. This is assumed since the stream depth is much smaller than the stream width.
- Lateral mixing (across the width) is a linear function of distance downstream.
- The effluent is neutrally buoyant (e.g. the effluent discharge temperature and salinity are not significantly different from the stream's ambient temperature and salinity).
- Complete mix is determined as the point downstream where the variation in concentration is 20% or less across the width and depth of the stream.
- The velocity of passing and drifting organisms is assumed equal to the stream velocity.

If it is suitably demonstrated that a reasonable potential for lethality or chronic impacts within the physical mixing area doesn't exist, then the basic complete mix equation, with 100% of the applicable stream flow, is appropriate. If the mixing analysis determines there is a potential for lethality or chronic impacts within the physical mixing area, then the proportion of stream flow that has mixed with the effluent over the allowed exposure time is used in the basic complete mix equation. As such, the wasteload allocation equation is modified to account for the decimal fraction of critical flow (f).

c. Effluent Limitations Toxic Pollutants, Outfall 001
9VAC25-31-220.D requires limits be imposed where a discharge has a reasonable potential to cause or contribute to an in-stream excursion of water quality criteria. Those parameters with WLAs that are near effluent concentrations are evaluated for limits.

The VPDES Permit Regulation at 9VAC25-31-230.D requires that monthly and weekly average limitations be imposed for continuous discharges from POTWs and monthly average and daily maximum limitations be imposed for all other continuous non-POTW discharges.

1) Ammonia as N/TKN:
Staff reevaluated the effluent pH values and has concluded that they are not significantly different than what was used previously to derive ammonia criteria and subsequent permit limits. Additionally, the stream pH values derived from

Ambient Monitoring Station 8-SAR068.57 downstream of Outfall 001 on the South Anna River for the November through March period were also not significantly different.

However, due to a technical error (use of a 0.08 MGD 30Q10 instead of a 0.008 MGD 30Q10) the ammonia limits will be changed to a monthly average of 2.5 mg/L and weekly average of 3.4 mg/L (April – October) and a monthly average of 5.0 mg/L and a weekly average of 6.8 mg/L (November – March); these are the ammonia limits present in the 2003 permit reissuance. The current monthly average and weekly average ammonia limits are 5.1 mg/L and 6.8 mg/L (April – October) and 8.5 mg/L and 11.5 mg/L (November – March). Review of the ammonia effluent data from December 2014 to June 2015 shows that the facility can meet the proposed limits (see **Attachment 10).**

The Environmental Protection Agency (EPA) finalized new, more stringent ammonia criteria in August 2013; possibly resulting in significant reductions in ammonia effluent limitations. It is staff's best professional judgment that incorporation of these criteria into the Virginia Water Quality Standards is forthcoming. This facility and others may be required to comply with new criteria in this permit term or during their next permit term.

2) Total Recoverable Zinc:
The 2009 permit reissuance for the Louisa Regional WWTP has a Total Recoverable Zinc limit of 100 µg/L. The treatment works has had occasions during the last five years when the limit was exceeded (see **Attachment 11** for a summary of the monitoring results for Total Recoverable Zinc for December 2009 through May 2015). Since a treatment plant upgrade was completed in November 2014, only the Total Recoverable Zinc values from December 2014 to May 2015 will be used to evaluate the reasonable potential and evaluate permit limits. It is noted that no exceedences of the Total Recoverable Zinc limit occurred during the period after the CTO was issued for the plant upgrade.

In order to ensure that only the bioavailable fraction of zinc is used to evaluate for toxicity, a zinc translator study was conducted (see **Attachment 12**). Zinc monitoring was conducted in May 2015 and the ratio of dissolved to total zinc was determined. Using zinc values from monitoring conducted in May 2015, a translator of 0.94 was calculated. Therefore, based on the result of this study, the treatment plant is allowed to discharge 6% more total recoverable zinc than the numeric value calculated using reasonable potential analysis.

Using the recalculated Total Recoverable Zinc limit using a hardness value of 106 mg/L collected on July 3, 2015 (after the treatment plant upgrade to 0.8 MGD) and the total recoverable zinc monitoring conducted from December 2014 to May 2015, it was determined that a Total Recoverable Zinc limit is not needed. See derivation of limits in **Attachment 10.** Semi-annual monitoring for Total Recoverable Zinc will be placed in the permit.

3) Total Recoverable Copper:
When this permit was reissued in 2004, it was determined that Total Recoverable Copper limits were necessary. The copper WER study approved by EPA in 2009 determined that the site-specific WER was 15.70. When this value was used to calculate copper criteria in 2009, it was determined that a permit limit for Total Recoverable Copper was not necessary.

A confirmatory copper WER study was conducted in March 2015 to demonstrate the WER obtained in 2008 is still appropriate for the current treatment plant discharge. This confirmatory copper WER study determined that the WER is 6.373. This value was used to recalculate copper criteria; it was determined that a permit limit for copper is not necessary. See derivation of limits in **Attachment 10**.

d. Effluent Limitations and Monitoring, Outfall 001 – Conventional and Non-Conventional Pollutants
No changes to D.O., carbonaceous biochemical oxygen demand-5 day ($CBOD_5$), total suspended solids (TSS), *E. coli*, and pH limitations are proposed.

The D.O. limit established ensures that the water quality standards for the receiving stream are met. The $CBOD_5$ limit is based on best professional judgment and Part MN-2.E of the DEQ 2014 VPDES Permit Manual as discussed in DEQ documentation from a stream inspection conducted in March 1994 (**Attachment 14**). This guidance is applicable to waters such as this portion of Beaver Creek where the water is shallow, flow is intermittent, and the waters cannot be modeled. The TSS limit of 20 mg/L, based on best professional judgment, was established when the permit was reissued in 2009. pH and *E. coli* limits are in accordance with the current Virginia Water Quality Standards.

e. Effluent Annual Average Limitations and Monitoring, Outfall 001 – Nutrients

VPDES Regulation 9VAC25-31-220(D) requires effluent limitations that are protective of both the numerical and narrative water quality standards for state waters, including the Chesapeake Bay. As discussed in Section 15, significant portions of the Chesapeake Bay and its tributaries are listed as impaired with nutrient enrichment cited as one of the primary causes. Virginia has committed to protecting and restoring the Bay and its tributaries. Only concentration limits are now found in the individual VPDES permit when the facility installs nutrient removal technology. The basis for the concentration limits is 9VAC25-40, *Regulation for Nutrient Enriched Waters and Dischargers within the Chesapeake Bay Watershed,* which requires new or expanding discharges with design flows of ≥0.04 MGD to treat for Total Nitrogen (TN) and Total Phosphorus (TP) to either BNR (Biological Nutrient Removal) levels (TN = 8 mg/L; TP = 1.0 mg/L) or SOA (State of the Art) levels (TN = 3.0 mg/L and TP = 0.3 mg/L).

This facility has also obtained coverage under 9VAC25-820, *General Virginia Pollutant Discharge Elimination System (VPDES) Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Bay Watershed in Virginia.* This regulation specifies and controls the nitrogen and phosphorus loadings from facilities and specifies facilities that must register under the general permit. Nutrient loadings for those facilities registered under the general permit and compliance schedules and other permit requirements shall be authorized, monitored, limited, and otherwise regulated under the general permit and not this individual permit. This facility has coverage under the Louisa County Water Authority Aggregate General Permit; the permit number is VAN030154. Allowable TN and TP Annual Loads for this facility's discharge are found in 9VAC25-720 (*Water Quality Management Plan Regulation),* which sets forth TN and TP maximum wasteload allocations for facilities designated as significant discharges (i.e., those with design flows of ≥0.5 MGD above the fall line and >0.1 MGD below the fall line). See **Attachment 13** for an excerpt of the *Water Quality Management Plan Regulation* containing the allowed TN and TP loads.

Monitoring for Nitrates + Nitrites, Total Kjeldahl Nitrogen, TN, and TP are included in this permit. The monitoring is needed to protect the Water Quality Standards of the Chesapeake Bay. Monitoring frequencies are set at the frequencies set forth in 9VAC25-820. Annual average effluent limitations and monthly and year to date calculations for TN and TP are included in this individual permit. The annual averages are based on the technology installed as part of the WQIF grant funding, 9VAC25-820-70 (Registration List), and the conditions that were present at the permitted design capacity of 0.4 MGD as defined in §62.1-44.19. See the baseline nutrient loading summary below.

TN = 18.7 mg/L x 0.4 MGD x 8.3438 x 365 days = 22,780 lbs/yr
TP = 2.5 mg/L x 0.4 MGD x 8.3438 x 365 days = 3,045 lbs/yr

At the 0.8 MGD design flow tier, an 8.0 mg/L Annual Concentration Average TN and a 1.0 mg/L Annual Concentration Average TP are proposed based on the CTO issued in November 2014 (see **Attachment 2**).

f. Effluent Limitations and Monitoring Summary:

The effluent limitations are presented in the following table. Limits were established for $cBOD_5$, TSS, Ammonia as N, pH, D.O., TN, TP, and *E. coli.* Monitoring is required for Nitrates + Nitrites, Total Kjeldahl Nitrogen (TKN), Total Hardness, Total Recoverable Zinc, and Whole Effluent Toxicity. The mass loading (kg/d) for $cBOD_5$ and TSS monthly and weekly averages were calculated by multiplying the concentration values (mg/L) with the flow values in MGD and a conversion factor of 3.785.

Sample Type and Frequency are in accordance with the recommendations in the VPDES Permit Manual.

The VPDES Permit Regulation at 9VAC25-31-30 and 40 CFR Part 133 require that the facility achieve at least 85% removal $CBOD_5$ and TSS (or 65% for equivalent to secondary). The limits in this permit are water-quality-based effluent limits and result in greater than 85% removal.

18. Antibacksliding:

In conformance with the 9VAC25-31-220.L of the VPDES regulations and §402(o)(2) of the Clean Water Act, the Total Recoverable Zinc limits were removed and replaced with semiannual monitoring. The basis for removal of the limits with this permit reissuance is that material and substantial alterations or additions to the permitted facility occurred. A Certificate to Operate the upgraded facility was issued on November 18, 2014. Evaluation of the effluent monitoring data collected since completion of the plant upgrade indicates there is no reasonable potential to cause or contribute to instream exceedances of water quality criteria for Zinc. The backsliding proposed conforms to the anti-backsliding provisions of Section 402(o) of the Clean Water Act, 9 VAC 25-31-220.L., and 40 § CFR 122.44. The continuation of monitoring in the permit for Zinc is consistent with DEQ practice and procedures.

19. Effluent Limitations/Monitoring Requirements:

Design flow is 0.80 MGD.

Effective Dates: During the period beginning with the permit's effective date and lasting until the expiration date.

PARAMETER	BASIS FOR LIMITS	DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS	
		Monthly Average	Weekly Average	Minimum	Maximum	Frequency	Sample Type
Flow (MGD)	NA	NL	NA	NA	NL	Continuous	TIRE
pH	1	NA	NA	6.0 S.U.	9.0 S.U.	1/D	Grab
$CBOD_5$ [a]	1, 2, 3	10 mg/L 30 kg/day	15 mg/L 45 kg/day	NA	NA	3D/W	8H-C
Total Suspended Solids (TSS) [a, b]	3	20 mg/L 60 kg/day	30 mg/L 91 kg/day	NA	NA	3D/W	8H-C
Dissolved Oxygen (DO)	1	NA	NA	6.0 mg/L	NA	1/D	Grab
Total Kjeldahl Nitrogen (TKN)	4	NL mg/L	NA	NA	NA	1/2W	8H-C
Ammonia, as N (April-October)	1	2.5 mg/L	3.4 mg/L	NA	NA	3D/W	8H-C
Ammonia, as N (November-March)	1	5.0 mg/L	6.8 mg/L	NA	NA	3D/W	8H-C
E. coli (Geometric Mean) [c]	1, 5	126 n/100ml	NA	NA	NA	3D/W	Grab
Nitrate+Nitrite, as N [d, e]	4	NL mg/L	NA	NA	NA	1/2W	8H-C
Total Nitrogen [d, e]	4	NL mg/L	NA	NA	NA	1/2W	Calculated
Total Nitrogen – Year to Date [d, e]	4	NL mg/L	NA	NA	NA	1/M	Calculated
Total Nitrogen - Calendar Year [d, e]	4	8.0 mg/L	NA	NA	NA	1/YR	Calculated
Total Phosphorus [d]	4	NL mg/L	NA	NA	NA	1/2W	8H-C
Total Phosphorus – Year to Date [d]	4	NL mg/L	NA	NA	NA	1/M	Calculated
Total Phosphorus - Calendar Year [d]	4	1.0 mg/L	NA	NA	NA	1/YR	Calculated
Zinc, Total Recoverable	1	NL µg/L	NL µg/L	NA	NA	1/6M [f]	Grab
Total Hardness	NA	NA	NL mg/L	NA	NA	1/6M [f]	Grab
Chronic Toxicity – C. dubia (TU_c)	NA	NA	NA	NA	NL	g	8H-C
Chronic Toxicity – P. promelas (TU_c)	NA	NA	NA	NA	NL	g	8H-C

The basis for the limitations codes are:

1. Water Quality Standards
2. Stream Inspection (**Attachment 14**)
3. Best Professional Judgment
4. 9VAC25-40 (Nutrient Regulation)
5. Pamunkey River Basin Bacteria TMDL

MGD= Million gallons per day.
NA= Not applicable.
NL= No limit; monitor and report.
TIRE= Totalizing, indicating and recording equipment.
S.U.= Standard units.

1/D= Once every day.
3D/W= Three days a week.
1/2W= Once every two weeks.
1/M = Once every month.
1/YR = Once every year.
1/6M = Twice every year.

8H-C= A flow proportional composite sample collected manually or automatically, and discretely or continuously, for the entire discharge of the monitored 8-hour period. Where discrete sampling is employed, the permittee shall collect a minimum of eight (8) aliquots for compositing. Discrete sampling may be flow proportioned either by varying the time interval between each aliquot or the volume of each aliquot. Time composite samples consisting of a minimum eight (8) grab samples obtained at hourly or smaller intervals may be collected where the permittee demonstrates that the discharge flow rate (gallons per minute) does not vary by 10% or more during the monitored discharge.

Grab= An individual sample collected over a period of time not to exceed 15 minutes.

a. At least 85% removal for $cBOD_5$ and TSS shall be attained for this effluent.
b. TSS shall be expressed as two significant figures.
c. Samples shall be collected between 10:00 a.m. and 4:00 p.m.
d. See Part I.B.3. of the permit for nutrient reporting calculations.
e. Total Nitrogen is the sum of Total Kjeldahl Nitrogen and NO_2+NO_3 Nitrogen and shall be calculated from the results of those tests.
f. Quarterly sampling shall be conducted during the calendar quarters of January – March, April – June, July – September, and October – December of each year. Monitoring results are to be submitted to DEQ with the DMRs due on January 10, April 10, July 10, and October 10 of each year.
g. See Part I.D. of the permit for toxicity monitoring requirements

20. Other Permit Requirements:

a. Part I.B. of the permit contains quantification levels and compliance reporting instructions.
9VAC25-31-190.L.4.c requires an arithmetic mean for measurement averaging and 9VAC25-31-220.D requires limits be imposed where a discharge has a reasonable potential to cause or contribute to an in-stream excursion of water quality criteria. Specific analytical methodologies for toxics are listed in this permit section as well as quantification levels (QLs) necessary to demonstrate compliance with applicable permit limitations or for use in future evaluations to determine if the pollutant has reasonable potential to cause or contribute to a violation. Required averaging methodologies are also specified.

The calculations for the Nitrogen and Phosphorus parameters shall be in accordance with the calculations set forth in 9VAC25-820 *General Virginia Pollutant Discharge Elimination System (VPDES) Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Bay Watershed in Virginia.* §62.1-44.19:13 of the Code of Virginia defines how annual nutrient loads are to be calculated; this is carried forward in 9VAC25-820-70. As annual concentrations (as opposed to loads) are limited in the individual permit, these reporting calculations are intended to reconcile the reporting calculations between the permit programs, as the permittee is collecting a single set of samples for the purpose of ascertaining compliance with two permits.

b. Permit Section Part I.C., details the requirements of a Pretreatment Program.
The VPDES Permit Regulation at 9VAC25-31-210 requires monitoring and 9VAC25-31-220.D requires all discharges to protect water quality. The VPDES Permit Regulation at 9VAC25-31-730 through 900 and the Federal Pretreatment Regulation at 40 CFR Part 403 requires POTWs with a design flow of >5.0 MGD and receiving from Industrial Users (IUs) pollutants that pass through or interfere with the operation of the POTW, or are otherwise subject to pretreatment standards, to develop a pretreatment program.

The Louisa Regional STP is a POTW with a current design capacity of 0.8 MGD. The Pretreatment Program for Lousia County was approved by DEQ on February 7, 2012. Two SIUs discharge into the Louisa Regional collection system.

The pretreatment program conditions in the proposed permit reissuance will include implementation of the approved pretreatment program in compliance with the Clean Water Act, the State Water Control Law, state regulations, and the approved Pretreatment Program.

c. Permit Section Part I.D. details the requirements for Whole Effluent Toxicity (WET) Program.
The VPDES Permit Regulation at 9VAC25-31-210 requires monitoring and 9VAC25-31-220.I requires limitations in the permit to provide for and assure compliance with all applicable requirements of the State Water Control Law and the Clean Water Act. A WET Program is imposed for municipal facilities with a design rate >1.0 MGD; with an approved pretreatment program or required to develop a pretreatment program; or those determined by the Board to require a program based on effluent variability, compliance history, instream waste concentration, and receiving stream characteristics. Louisa County has a pretreatment program that includes two significant industrial users that discharge to the collection system. Monitoring is to be conducted in accordance with the schedule in Part I.D.2 of the permit.

21. Other Special Conditions:

a. **95% Capacity Reopener.** The VPDES Permit Regulation at 9VAC25-31-200.B.4 requires all POTWs and PVOTWs develop and submit a plan of action to DEQ when the monthly average influent flow to their sewage treatment plant reaches 95% or more of the design capacity authorized in the permit for each month of any three consecutive month period. This facility is a POTW.

a. **Indirect Dischargers.** Required by the VPDES Permit Regulation at 9VAC25-31-200 B.1 and B.2 for POTWs and PVOTWs that receive waste from someone other than the owner of the treatment works.

b. **Operations and Maintenance (O&M) Manual Requirement.** Required by the Code of Virginia at §62.1-44.19; the Sewage Collection and Treatment Regulations at 9VAC25-790; and the VPDES Permit Regulation at 9VAC25-31-190.E. The permittee shall maintain a current O&M Manual. The permittee shall operate the treatment works in accordance with the O&M Manual and shall make the O&M Manual available to Department personnel for review upon request. Any changes in the practices and procedures followed by the permittee shall be documented in the O&M Manual within 90 days of the effective date of the changes. Non-compliance with the O&M Manual shall be deemed a violation of the permit.

c. **CTC, CTO Requirement.** The Code of Virginia at § 62.1-44.19 and the Sewage Collection and Treatment Regulations at 9VAC25-790 require that all wastewater treatment works obtain a Certificate to Construct prior to commencing construction and to obtain a Certificate to Operate prior to commencing operation of the treatment works.

d. **Licensed Operator Requirement.** The Code of Virginia at §54.1-2300 et seq., the VPDES Permit Regulation at 9VAC25-31-200 C, and the Board for Waterworks and Wastewater Works Operators and Onsite Sewage System Professionals Regulations at 18VAC160-20-10 et seq. requires licensure of operators. This facility requires a Class II operator.

e. **Reliability Class.** The Sewage Collection and Treatment Regulations at 9VAC25-790 require sewage treatment works to achieve a certain level of reliability in order to protect water quality and public health consequences in the event of component or system failure. Reliability means a measure of the ability of the treatment works to perform its designated function without failure or interruption of service. The facility is required to meet a Reliability Class of I.

f. **Water Quality Criteria Monitoring.** The State Water Control Law at §62.1-44.21 authorizes the Board to request information needed to determine the discharge's impact on State waters. States are required to review data on discharges to identify actual or potential toxicity problems or the attainment of water quality goals according to 40 CFR Part 131 (Water Quality Standards, Subpart 131.11). To ensure that water quality criteria are maintained after the upgrade of the facility in November 2014 to 0.8 MGD, the permittee is required to analyze the facility's effluent for the substances noted in Attachment A of this VPDES permit. Monitoring results must be submitted to the Department of Environmental Quality, Northern Regional Office (DEQ-NRO) by January 10, 2018.

g. **Water Quality Criteria Reopener.** The VPDES Permit Regulation at 9VAC25-31-220 D requires establishment of effluent limitations to ensure attainment/maintenance of receiving stream water quality criteria. Should effluent monitoring indicate the need for any water quality-based limitations, this permit may be modified or alternatively revoked and reissued to incorporate appropriate limitations.

h. **Sludge Reopener.** The VPDES Permit Regulation at 9VAC25-31-220.C requires all permits issued to treatment works treating domestic sewage (including sludge-only facilities) include a reopener clause allowing incorporation of any applicable standard for sewage sludge use or disposal promulgated under Section 405(d) of the Clean Water Act (CWA).

i. **Sludge Use and Disposal.** The VPDES Permit Regulation at 9VAC25-31-100.P; 220.B.2, and 420 through 720 and 40 CFR Part 503 require all treatment works treating domestic sewage to submit information on their sludge use and disposal practices and to meet specified standards for sludge use and disposal. The facility includes a treatment works for domestic sewage.

j. **E3/E4.** 9VAC25-40-70 B authorizes DEQ to approve an alternate compliance method to the technology-based effluent concentration limitations as required by subsection A of this section. Such alternate compliance method shall be incorporated into the permit of an Exemplary Environmental Enterprise (E3) facility or an Extraordinary Environmental Enterprise (E4) facility to allow the suspension of applicable technology-based effluent concentration limitations during the period the E3 or E4 facility has a fully implemented environmental management system that includes operation of installed nutrient removal technologies at the treatment efficiency levels for which they were designed.

k. **Nutrient Reopener.** 9VAC25-40-70 A authorizes DEQ to include technology-based annual concentration limits in the permits of facilities that have installed nutrient control equipment, whether by new construction, expansion or upgrade. 9VAC25-31-390 A authorizes DEQ to modify VPDES permits to promulgate amended water quality standards.

l. **TMDL Reopener.** This special condition is to allow the permit to reopened if necessary to bring it in compliance with any applicable TMDL that may be developed and approved for the receiving stream.

22. Permit Section Part II.

Required by VPDES Regulation 9VAC25-31-190, Part II of the permit contains standard conditions that appear in all VPDES Permits. In general, these standard conditions address the responsibilities of the permittee, reporting requirements, testing procedures and records retention.

23. Changes to the Permit from the Previously Issued Permit:

a. Special Conditions:
1) A Water Quality Monitoring Special Condition has been added.
2) The Nutrient Offsets Special Condition has been removed because this treatment works has WLAs for TN and TP in the 9VAC25-820-70 Registration List dated January 20, 2015.

b. Monitoring and Effluent Limitations:
1) The ammonia limits have been changed to a monthly average of 2.4 mg/L and weekly average of 3.4 mg/L for April – October and a monthly average of 5.0 mg/L and a weekly average of 6.8 mg/L for November through March. See Section 17.c. 1) of this fact sheet.
2) The Total Recoverable Zinc limits have been removed. Semi-annual monitoring for Total Recoverable Zinc has been placed in this permit.
3) Semi-annual monitoring for Total Hardness has been added.

c. Other:
1) The 0.40 MGD flow tier has been removed.
1) The 30Q10 and 7Q10 high flow values have been recalculated. A high flow 1Q10 value has been added.
2) The River Mile has been changed from 5.88 to 7.5 to more thoroughly incorporate the meanderings of the receiving stream.

24. Variances/Alternate Limits or Conditions: None

25. Public Notice Information:

First Public Notice Date: 10/29/2015 Second Public Notice Date: 11/5/2015

Public Notice Information is required by 9VAC25-31-280 B. All pertinent information is on file and may be inspected, and copied by contacting the: DEQ Northern Regional Office, 13901 Crown Court, Woodbridge, VA 22193, Telephone No. (703) 583-3837, anna.westernik@deq.virginia.gov. See **Attachment 15** for a copy of the public notice document.

Persons may comment in writing or by email to the DEQ on the proposed permit action, and may request a public hearing, during the comment period. Comments shall include the name, address, and telephone number of the writer and of all persons represented by the commenter/requester, and shall contain a complete, concise statement of the factual basis for comments. Only those comments received within this period will be considered. The DEQ may decide to hold a public hearing, including another comment period, if public response is significant and there are substantial, disputed issues relevant to the permit. Requests for public hearings shall state 1) the reason why a hearing is requested; 2) a brief, informal statement regarding the nature and extent of the interest of the requester or of those represented by the requester, including how and to what extent such interest would be directly and adversely affected by the permit; and 3) specific references, where possible, to terms and conditions of the permit with suggested revisions. Following the comment period, the Board will make a determination regarding the proposed permit action. This determination will become effective, unless the DEQ grants a public hearing. Due notice of any public hearing will be given. The public may request an electronic copy of the draft permit and fact sheet or review the draft permit and application at the DEQ Northern Regional Office by appointment.

26. Additional Comments:

a. Previous Board Action(s): Louisa County Water Authority entered into a Consent Order with DEQ on February 4, 2011. The Schedule of Compliance in the Consent Order includes: evaluating and updating laboratory standard operating procedures; maintaining a log of the ultra violet system cleaning; establishing a pretreatment program; submitting a plan and schedule for a program to meet the permitted zinc limits; and submitting completed Chain of Custody Forms, Certificate of Analysis Forms, and other applicable compliance sampling bench sheets to DEQ for the life of the Consent Order **(Attachment 16)**.

b. Staff Comments:

1) This permitting action was delayed due to awaiting the finalization of the Streamlined Copper WER Study and the Zinc Translator Study.

2) Louisa County Water Authority personnel land apply the biosolids from this facility. VPA Permit VPA00074 contains conditions and requirements for the monitoring and land application of biosolids. The VPDES Permit Regulation at 9VAC25-31-420 through 729 establishes the standards for the use or disposal of biosolids; specifically land application and surface disposal promulgated under 40 CFR Part 503. Standards consist of general requirements, pollutant limits, management practices and operational standards. Furthermore, the VPA Regulation at 9VAC25-32-303 through 685 sets forth the requirements pertaining to Class B biosolids. VPA00074 enforces the parameters to be monitored, monitoring frequencies, sampling types, the Biosolids Management Plan, and reporting requirements.

c. Public Comment: No comments were received during the public notice.

ATTACHMENTS

Attachment 1	Flow Frequency Determination
Attachment 2	November 2014 CTO for the 0.8 MGD Upgrade
Attachment 3	Facility Schematic
Attachment 4	Mineral Topographic Map (DEQ #171C)
Attachment 5	March 2015 Site Visit
Attachment 6	2014 Planning Statement
Attachment 7	90th Percentile pH Calculations
Attachment 8	Water Quality Criteria/WLA Spreadsheet
Attachment 9	May 2015 Copper WER Study
Attachment 10	Derivation of Water Quality Based Permit Limits
Attachment 11	Summary of Zinc Monitoring Results
Attachment 12	June 2015 Zinc Translator Study
Attachment 13	Excerpt of the *Water Quality Management Plan Regulation*
Attachment 14	Stream Inspection and Discussion of $CBOD_5$ Limits
Attachment 15	Public Notice
Attachment 16	The Compliance Schedule from the 2011 Consent Order

Flow Frequency Determination
Anna Westernik, Permit Writer
May 22, 2015

Louisa Regional WWTP
VA0067954

Flow data from 1976 through 1986 were verified using the gaging station on Contrary Creek near Mineral, VA (#01670300) as the reference station. The values presented at the discharge point do not address any withdrawals, discharges, or springs lying upstream.

Contrary Creek near Mineral, VA (#01670300)
Drainage Area = 5.53 sq. mi.

1Q10 (cfs)	0.04	High Flow 1Q10 (cfs)	0.64
7Q10 (cfs)	0.05	High Flow 7Q10 (cfs)	0.83
30Q10 (cfs)	0.12	High Flow 30Q10 (cfs)	1.2
30Q5 (cfs)	0.21	Harmonic Mean (cfs)	0.9

Beaver Creek at Discharge Point
Drainage Area = 0.57 sq. mi.

	cfs	**MGD**
1Q10	0.004	0.003
7Q10	0.005	0.003
30Q10	0.012	0.008
30Q5	0.022	0.014
High Flow 1Q10	0.066	0.043
High Flow 7Q10	0.086	0.055
High Flow 30Q10	0.124	0.080
Harmonic Mean	0.093	0.060

High flow months are November through April.

Attachment 1

COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY

Street address: 629 East Main Street, Richmond, Virginia 23219
Mailing address: P.O. Box 1105, Richmond, Virginia 23218
www.deq.virginia.gov

Molly Joseph Ward
Secretary of Natural Resources

David K. Paylor
Director

(804) 698-4000
1-800-592-5482

November 18, 2014

Louisa County
Louisa Regional STP
VA 0067954

Ms. Pam Baughman, Director
Louisa County Water Authority
3380 Jefferson Highway
Louisa, VA 23903

Dear Ms. Baughman:

Enclosed is the Certificate to Operate (CTO) for the above mentioned facility. This action is in accordance with the Virginia *Sewage Collection and Treatment Regulations.*

If you have any questions regarding the CTO, please feel free to contact this office.

Sincerely,

Walter A. Gills, Program Manager
Clean Water Financing & Assistance Program

Attachment 2

COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY

Street address: 629 East Main Street, Richmond, Virginia 23219
Mailing address: P.O. Box 1105, Richmond, Virginia 23218
www.deq.virginia.gov

Molly Joseph Ward
Secretary of Natural Resources

David K. Paylor
Director

(804) 698-4000
1-800-592-5482

CERTIFICATE TO OPERATE

Owner: Louisa County Water Authority

Facility/System Name: Louisa Regional STP

VPDES Permit Number: VA0067954

Description of the Facility/System: This project expanded the Louisa County Regional WWTP from 0.4 million gallons per day (MGD) to 0.8 MGD and upgraded the treatment to a Biological Nutrient Removal (BNR) facility. The project included a new influent pump station, aerated grit collector, flow metering, anaerobic/aerobic reactor, modifications to existing oxidation ditches, internal recycle pump station, secondary clarifier, Return Activated Sludge(RAS) pump station, scum pit, tertiary filtration building, additional ultraviolet (UV) disinfection, cascade aerator, sludge belt press, sludge pumps and polymer feed.

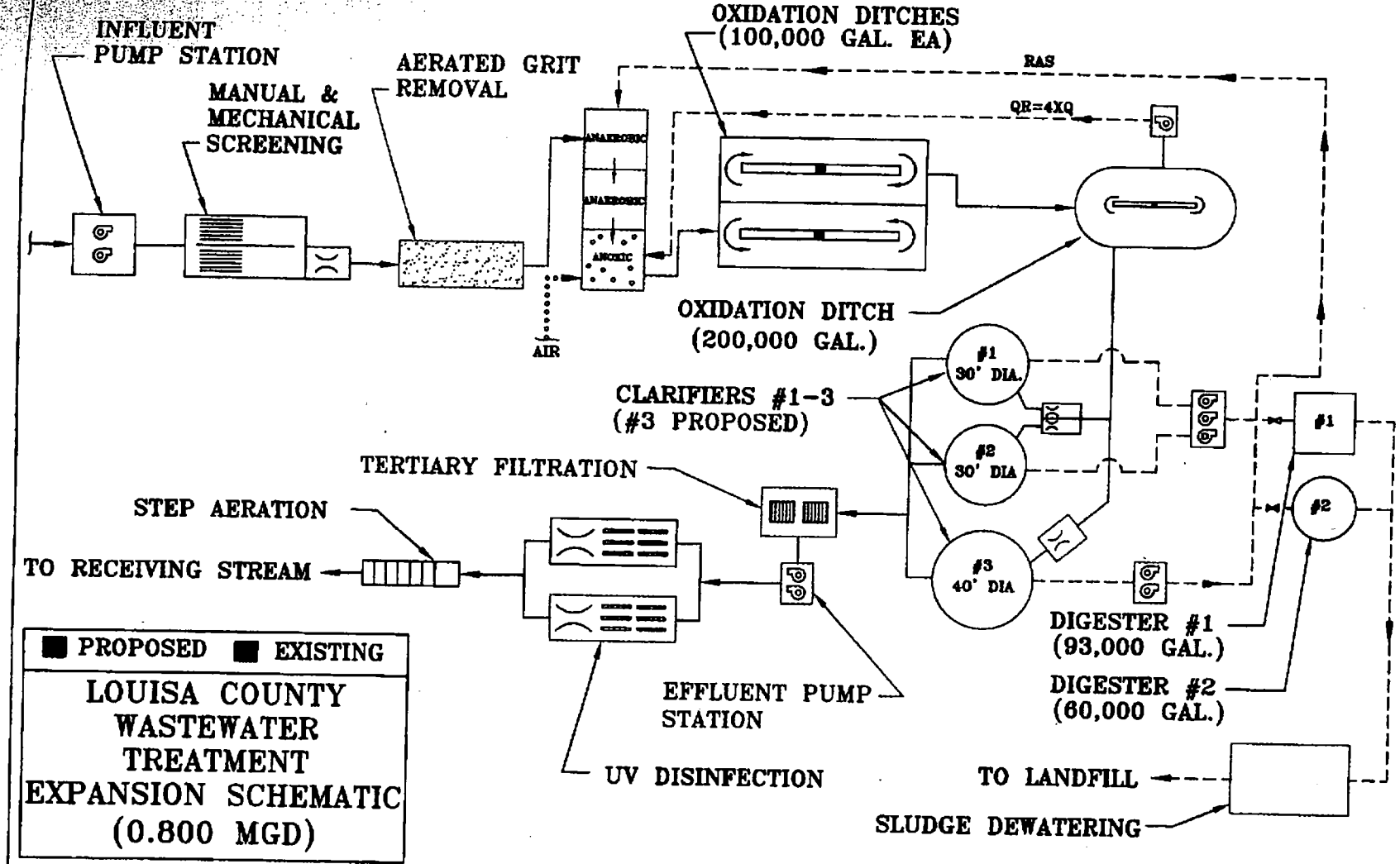
The project is designed to comply with average monthly effluent limits of 10 mg/l cBOD5; 20 mg/l TSS; 5.1 mg/l Ammonia as N (Apr-Oct); 8.5 mg/l Ammonia as N (Nov-Mar); 126 n/100 mls E. coli (geometric mean); pH range 6.0-9.0 S.U.; and Total Recoverable Zinc of 100 µg/l. Additionally, the project is designed to meet an annual average Total Nitrogen concentration of 8.0 mg/l and an annual average Total Phosphorus concentration of 1.0 mg/l.

Authorization to Operate: The owner's consulting engineer has certified in writing by letter dated October 30, 2014 that the facility has been constructed as per the approved plans and specifications. Therefore, the owner has authorization to operate the 0.8 MGD facility.

ISSUANCE:

Walter A. Gills, Program Manager
DEQ-CWFAP

Date: November 18, 2014



Dewberry Dewberry & Davis, Inc. 4180 Innslake Drive Glen Allen, Virginia 23060 Phone: 804.290.7657 Fax: 804.290.7928	DATE DEC 2008	TITLE PROPOSED FACILITIES LINE DIAGRAM	SHEET NO. FIG. 5.2
	PROJ. NO. LCWA	PROJECT LOUISA REGIONAL WWTP EXPANSION - PER	

Attachment 3

Mineral Topographic Map (DEQ #171C)

△ Louisa Regional STP

N
W E
S

Attachment 4

VIRGINIA DEPARTMENT OF
ENVIRONMENTAL QUALITY

MEMORANDUM
Northern Regional Office

TO: File

FROM: Anna Westernik, Water Permit Writer

DATE: April 2, 2015

SUBJECT: March 31, 2015 Site Visit -- Louisa Regional WWTP (VA0067954)

A site visit was made to the Louisa Regional WWTP on March 31, 2015 for the purpose of touring the facility prior to reissuing the permit. Individuals present during the inspection were Wes Basore, Pam Baughman, Randy Gray of the Louisa County Water Authority and me.

The Louisa Regional Wastewater Treatment Plant (WWTP) is a 0.80-MGD facility (CTO issued in November 2014). The County of Louisa and Town of Louisa jointly own the WWTP. Wastewater from the County and Town is pumped to the influent pump station; two variable speed pumps are used to pump the wastewater to the influent screens and grit removal system. Septage is also received in this area. If fats, oil, and grease are received, they bypass the treatment process and are sent directly to the digester.

After the primary process, the sewage is treated by the anaerobic/anoxic basin in order to achieve denitrification and biological phosphorus removal. Effluent is then sent to secondary treatment for aeration and dissolved oxygen removal.

Final treatment consists of clarification, a 10 micron Aqua Disk filter, ultraviolet disinfection, and cascade aeration.

Wasted sludge is sent to two digesters and subsequently a press that operates two to three days per week. Biosolids are land applied.

Discharge is to Beaver Creek.

Attachment 5

To:	Alison Thompson
From:	Rebecca Shoemaker
Date:	June 27, 2014
Subject:	Planning Statement for Louisa Regional WWTP
Permit Number:	VA0067954

Information for Outfall 001:

Discharge Type:	Municipal
Discharge Flow:	0.4 MGD and undergoing construction for 0.8 MGD
Receiving Stream:	Beaver Creek
Latitude / Longitude:	38.008712, -77.99367
Rivermile:	7.50
Streamcode:	8-BVR
Waterbody:	VAN-F02R
Water Quality Standards:	Section 3, Class III, No special standards
Drainage Area:	0.57 sq mi

1. Please provide water quality monitoring information for the receiving stream segment. If there is not monitoring information for the receiving stream segment, please provide information on the nearest downstream monitoring station, including how far downstream the monitoring station is from the outfall.

   This facility discharges into Beaver Creek. DEQ ambient monitoring station 8-BVR005.57 is located directly upstream from Outfall 001; however, it was monitored only once (during 1998) and this Beaver Creek segment has not been assessed since 2002.

   The closest downstream DEQ monitoring station is 8-SAR068.57, located approximately 9.50 miles downstream from Outfall 001. This station is a DEQ ambient trend monitoring station on the South Anna River at the Route 605 bridge crossing. The following is the summary for this portion of the South Anna River, as taken from the 2012 Integrated Report:

   Class III, Section 3.

   DEQ monitoring stations located in this segment of the South Anna River:
   - *Ambient trend monitoring station 8-SAR068.57, at Route 605.*

   The aquatic life use is considered fully supporting. E. coli monitoring finds a bacterial impairment, resulting in an impaired classification for the recreation use. This impairment is nested within the downstream completed bacteria TMDL for the Pamunkey River. The fish consumption use was not assessed. The wildlife use is considered fully supporting.

2. Does this facility discharge to a stream segment on the 303(d) list? If yes, please fill out Table A.

   No.

Attachment 6

3. Are there any downstream 303(d) listed impairments that are relevant to this discharge? If yes, please fill out Table B.

Table B. Information on Downstream 303(d) Impairments and TMDLs

Waterbody Name	Impaired Use	Cause	Distance From Outfall	TMDL completed	WLA	Basis for WLA	TMDL Schedule
Impairment Information in the 2012 Integrated Report							
South Anna River	Recreation	*E. coli*	9.30 miles	Pamunkey River Basin Bacteria 8/2/2006	1.39E+12 cfu/year *E. coli*	126 cfu/100 ml *E. coli* --- 0.8 MGD	---

4. Is there monitoring or other conditions that Planning/Assessment needs in the permit?

   There is a completed downstream TMDL for the aquatic life use impairment for the Chesapeake Bay. However, the Bay TMDL and the WLAs contained within the TMDL are not addressed in this planning statement.

5. Fact Sheet Requirements – Please provide information regarding any drinking water intakes located within a 5 mile radius of the discharge point.

   There is one drinking water intake for Louisa County located within a five mile radius of Outfall 001.

Louisa Regional WWTP
Effluent pH Data
(Dec 2014 -- May 2015)

High Flow Period (Nov -- Mar)		Low Flow Period (Apr -- Oct)	
Dec-14	7.70	Apr-15	7.40
	7.00		7.40
	7.30		7.40
	7.40		7.60
	7.20		7.70
	7.40		7.60
	7.40		7.50
	7.50		7.50
	7.30		7.50
	7.20		7.50
	7.40		7.40
	6.80		7.50
	7.10		7.60
	6.70		7.50
	7.50		7.40
	7.30		7.50
	7.10		7.50
	7.20		7.50
	7.20		7.50
	7.30		7.60
	7.30		7.50
	7.40		7.60
	7.10		7.50
	6.70		7.70
	7.10		7.40
	7.00		7.60
	7.10		7.50
	7.20		7.40
	7.00		7.50
	7.10		7.60
	7.20	May-15	7.50
Jan-15	7.40		7.50
	7.00		7.50
	7.40		7.50
	7.00		7.50
	7.00		7.50
	7.10		7.60
	7.20		7.40
	7.20		7.40
	7.30		7.50

Attachment 7

Louisa Regional WWTP
Effluent pH Data
(Dec 2014 -- May 2015)

High Flow Period (Nov -- Mar)		Low Flow Period (Apr -- Oct)
	7.50	7.50
	7.30	7.30
	7.10	7.50
	7.10	7.30
	7.30	7.40
	7.00	7.50
	7.10	7.40
	7.40	7.50
	7.50	7.40
	7.10	7.50
	7.30	7.40
	7.10	7.50
	7.50	7.50
	7.40	7.50
	7.20	7.50
	7.30	7.50
	6.90	7.40
	7.10	7.50
	7.00	7.40
	7.00	7.40
	7.00	7.50
	7.30	**90th Percentile** **7.6**
Feb-15	7.60	
	7.60	
	7.60	
	7.50	
	7.50	
	7.60	
	7.60	
	7.50	
	7.60	
	7.60	
	7.50	
	7.50	
	7.50	
	7.50	
	7.60	
	7.30	
	7.20	
	7.40	
	7.60	
	7.60	

Louisa Regional WWTP
Effluent pH Data
(Dec 2014 -- May 2015)

High Flow Period (Nov -- Mar)		Low Flow Period (Apr -- Oct)
	7.60	
	7.70	
	7.60	
	7.50	
	7.50	
	7.50	
	7.60	
	7.70	
Mar-15	7.60	
	7.70	
	7.60	
	7.50	
	7.50	
	7.40	
	8.00	
	7.60	
	7.10	
	7.30	
	7.40	
	7.40	
	7.30	
	7.50	
	7.50	
	7.40	
	7.50	
	7.50	
	7.50	
	7.60	
	7.50	
	7.60	
	7.30	
	7.40	
	7.40	
	7.40	
	7.30	
	7.30	
	7.40	
	7.30	
	7.30	
90th Percentile	**7.6**	

2009 Effluent
pH data

7.6
7.3
7.2
7.2
7.4
7.4
7.3
7.5
7.5
7.5
7.4
7.5
7.5
7.4
7.5
7.3
7.4
7.5
7.5
7.3
7.4
7.5
7.3
7.5
7.5
7.5
7.8
7.7
7.5
7.7
7.7
7.5
7.7
7.6
7.5
7.6
7.6
7.5
7.6
7.6
7.5
7.6
7.5
7.6
7.5
7.4
7.6
7.5
7.7
7.7
7.5
7.5

7.4
7.4
7.5
7.4
7.4
7.5
7.5
7.3
7.3
7.4
7.4
7.4
7.3
7.5
7.5
7.5
7.5
7.5
7.4
7.3
7.5
7.4
7.4
7.5
7.5
7.4
7.5
7.1
7.2
7.2
7.2
7.2
7.2
7.1
7.3
7.3
7.2
7.3
7.4
7.4
7.3
7.3
7.4
7.4
7.5
7.4
7.5
7.4
7.3
7.4
7.4
7.5

7.5
7.6
7.6
7.6
7.5
7.5
7.4
7.4
7.7
7.5
7.5
7.4
7.4
7.3
7.5
7.5
7.4
7.5
7.5
7.9
7.5
7.6
7.5
7.5
7.6
7.5
7.4
7.6
7.5
7.6
7.5
7.5
7.5
7.5
7.5
7.6
7.5
8.2
8.4
8.1
7.1
7.4
7.4
7.4
7.1
7.4
7.4
7.3
7.2
7.4
7.4
7.4

7.4
7.5
7.4
7.3
7.4
7.4
7.3
7.4
7.5
7.5
7.5
7.4
7.3
7.3
7.4
7.6
7.4
7.5
7.4
7.3
7.2
7.2
7.1
7.1
7.3
7.3
7.3
7
7.1
7.2
7.2
7.3
7.1
7.1
7.4
7.4
7.3
7.3
7.5
7.5
7.4
7.5
7.4
7.3
7.3
7.4
7.4
7.3
7.5
7.5
7.4
7.3

2009 Effluent pH data

7.6
7.3
7.2
7.2
7.4
7.4
7.3
7.5
7.5
7.5
7.4
7.5
7.5
7.4
7.5
7.3
7.4
7.5
7.5
7.3
7.4
7.5
7.3
7.5
7.5
7.5
7.8
7.7
7.5
7.7
7.7
7.5
7.7
7.6
7.5
7.6
7.6
7.5
7.6
7.6
7.5
7.6
7.5
7.6
7.5
7.4
7.6
7.5
7.7
7.7
7.5
7.5

7.3
7.4
7.4
7.5
7.4
7.4
7.5
7.4
7.3
7.6
7.4
7.4
7.4
7.2
7.2
7.4
7.4
7.5
7.5
7.4
7.3
7.4
7.4
7.5
7.5
7.3
7.5
7.5
7.5
7.4
7.5
7.4
7.3
7.3
7.4
7.4
7.4
7.5
7.4
7.3
7.3
7.4
7.5
7.4
7.4
7.4
7.3
7.2
7.4
7.5
7.4
7.5

7.3
7.4
7.4
7.5
7.4
7.4
7.5
7.4
7.3
7.6
7.4
7.4
7.4
7.2
7.2
7.4
7.4
7.5
7.5
7.4
7.3
7.4
7.4
7.5
7.5
7.3
7.5
7.5
7.5
7.4
7.5
7.4
7.3
7.3
7.4
7.4
7.4
7.5
7.4
7.3
7.3
7.4
7.5
7.4
7.4
7.4
7.3
7.2
7.4
7.5
7.4
7.5

7.5

7.6 90th percentile pH

LOUISA COUNTY WATER AUTHORITY
2014 EFFLUENT TEMPERATURE

Date	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Apr-Oct	Nov - Mar
1	9.9	7	7.5	11	13.7	18.5	23.7	22.7	23.9	20.5	15.8	12.4	25.5	15.9
2	9.9	8.7	8.4	10.7	14.4	18.4	22.6	22.5	24.2	20.7	14.8	12	24.6	15.8
3	9.5	8.9	8	12.8	14.6	19.1	22.2	22.3	24.6	21.1	13.3	12.2	24.3	15.5
4	8.5	8.3	6.9	12.6	15	19.9	22.4	22.3	24.2	20.3	14.6	11.8	24.2	15.1
5	9	8.7	7	12.4	14.8	20.4	22	22.5	24.1	19	15.1	12.3	24.2	15
6	9.8	8.6	7.5	11.8	15	20.3	23	23.5	24.3	18.1	15.9	12.5	24.1	15
7	8.3	8.4	7.8	11.5	16.1	19.6	23.1	22.9	23.7	1.9	15.5	12.2	24	14.8
8	7.4	8.5	8	12	16.6	19.8	23.4	22.5	23.1	19	14.4	11.4	24	14.6
9	7.9	8.5	9.3	12	17.1	20.1	24	22.6	22.4	18.5	14.2	11.3	23.9	14.6
10	7.7	8.4	9	11.6	18	21.3	22.4	22	25.5	19.3	13.9	11.3	23.7	14.5
11	9.4	7.8	9.9	12.6	17.4	21.5	22.6	22.3	22.7	19	14.5	10.1	23.7	14.4
12	9.9	7.1	10.8	13.1	17.6	21.3	23.1	22.1	22.8	18.4	15	10.6	23.7	14.3
13	9.6	6.1	9.9	14	18.2	21.4	23.4	22	22.3	18.6	15	10.7	23.7	14.2
14	10.2	6.8	8.9	15.3	18	21.2	22	21.7	20.8	19.4	14.2	10.6	23.5	14.2
15	10.1	8.1	9.5	15.8	18.4	20.4	21.4	21.9	20.2	20	12.6	9.6	23.5	13.9
16	10.2	7.8	10	12.2	18	21.1	23.7	22	21	19.6	12.7	10.7	23.5	13.6
17	9.5	7.9	8.6	11.8	17.1	21.8	22.6	22.3	20.8	19	13.3	11	23.4	13.3
18	9.3	8.1	8.4	12.2	16	22.3	22.2	22.1	20.6	19	12.8	10.4	23.4	13.3
19	8.8	8.6	8.9	11.9	16.4	23	22.4	22.6	20.9	18.2	11.5	10.6	23.4	13.2
20	8.9	8.6	9.3	12.7	16.2	22.5	22	23	20.6	16.8	11.3	10.3	23.4	13.2
21	9.1	9.1	9.7	12.8	17.4	22	23	23	20.7	17.2	11.2	10.1	23.2	12.8
22	7.6	9.1	10.3	13.4	18.6	21.8	23.1	23.5	20.6	17.8	11.5	10.1	23.1	12.7
23	7.7	9.3	10.5	13.6	18.9	21.4	23.4	23.5	20.4	16.8	11.4	10.4	23.1	12.6
24	6.2	9.7	9.7	13.2	18.1	22.2	24	22.9	19.6	16.9	13.6	11.1	23.1	12.5
25	6	9.3	9.4	13.6	18.2	22.7	22.4	21.9	19.8	16.5	14.6	11	23.1	12.4
26	6.6	8.9	8.7	13.3	18.4	22.8	22.6	21.8	20.2	16.5	14.3	11.2	23.1	12.3
27	7	8.5	8.4	13.8	19.4	23.2	23.1	22	19.5	15.8	13.2	10.8	23	12.3
28	7.1	7.8	9.4	14.8	19.9	22.1	23.4	22.5	19.3	16.3	12.3	10.9	23	12.2
29	6.4	7.8	11.1	14.3	19.8	21.8	22	22.3	19.6	17.5	11.6	11.6	23	12.2
30	6		11.8	13.3	18.9	21.4	21.4	22.8	20.9	16.9	11.8	13.2	23	12
31	6.2		11.3		18.5		21.5	23.7		16.2		9.7	23	11.8
													22.9	11.8
													22.9	11.8
													22.8	11.6
													22.8	11.6
													22.8	11.5

90th Percentile Values

LOUISA COUNTY WATER AUTHORITY
2014 EFFLUENT TEMPERATURE

Date	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Apr-Oct	Nov - Mar
													22.7	11.5
													22.7	11.4
													22.7	11.4
													22.6	11.3
													22.6	11.3
													22.6	11.3
													22.6	11.3
													22.6	11.2
													22.6	11.2
													22.5	11.1
													22.5	11.1
													22.5	11
													22.5	11
													22.5	10.9
													22.4	10.8
													22.4	10.8
													22.4	10.7
													22.4	10.7
													22.4	10.6
													22.3	10.6
													22.3	10.6
													22.3	10.5
													22.3	10.4
													22.3	10.4
													22.3	10.3
													22.3	10.3
													22.2	10.2
													22.2	10.2
													22.2	10.1
													22.1	10.1
													22.1	10.1
													22.1	10.1
													22	10
													22	9.9
													22	9.9
													22	9.9

LOUISA COUNTY WATER AUTHORITY
2014 EFFLUENT TEMPERATURE

Date	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Apr-Oct	Nov - Mar
													22	9.9
													22	9.9
													22	9.8
													22	9.7
													22	9.7
													21.9	9.7
													21.9	9.7
													21.8	9.6
													21.8	9.6
													21.8	9.5
													21.8	9.5
													21.7	9.5
													21.5	9.4
													21.5	9.4
													21.4	9.4
													21.4	9.3
													21.4	9.3
													21.4	9.3
													21.4	9.3
													21.3	9.3
													21.3	9.1
													21.2	9.1
													21.1	9.1
													21.1	9
													21	9
													20.9	8.9
													20.9	8.9
													20.8	8.9
													20.8	8.9
													20.7	8.9
													20.7	8.8
													20.6	8.7
													20.6	8.7
													20.6	8.7
													20.5	8.6
													20.4	8.6

LOUISA COUNTY WATER AUTHORITY
2014 EFFLUENT TEMPERATURE

Date	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Apr-Oct	Nov - Mar
													20.4	8.6
													20.4	8.6
													20.3	8.5
													20.3	8.5
													20.2	8.5
													20.2	8.5
													20.1	8.4
													20	8.4
													19.9	8.4
													19.9	8.4
													19.8	8.4
													19.8	8.3
													19.8	8.3
													19.6	8.1
													19.6	8.1
													19.6	8
													19.6	8
													19.5	7.9
													19.4	7.9
													19.4	7.8
													19.3	7.8
													19.3	7.8
													19.1	7.8
													19	7.8
													19	7.7
													19	7.7
													19	7.6
													19	7.5
													18.9	7.5
													18.9	7.4
													18.6	7.1
													18.6	7.1
													18.5	7
													18.5	7
													18.5	7
													18.4	6.9

LOUISA COUNTY WATER AUTHORITY
2014 EFFLUENT TEMPERATURE

Date	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Apr-Oct	Nov - Mar
													18.4	6.8
													18.4	6.6
													18.4	6.4
													18.2	6.2
													18.2	6.2
													18.2	6.1
													18.1	6
													18.1	6
													18	
													18	
													18	
													17.8	
													17.6	
													17.5	
													17.4	
													17.4	
													17.2	
													17.1	
													17.1	
													16.9	
													16.9	
													16.8	
													16.8	
													16.6	
													16.5	
													16.5	
													16.4	
													16.3	
													16.2	
													16.2	
													16.1	
													16	
													15.8	
													15.8	
													15.3	
													15	

LOUISA COUNTY WATER AUTHORITY
2014 EFFLUENT TEMPERATURE

Date	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Apr-Oct	Nov - Mar
													15	
													14.8	
													14.8	
													14.6	
													14.4	
													14.3	
													14	
													13.8	
													13.7	
													13.6	
													13.6	
													13.4	
													13.3	
													13.3	
													13.2	
													13.1	
													12.8	
													12.8	
													12.7	
													12.6	
													12.6	
													12.4	
													12.2	
													12.2	
													12	
													12	
													11.9	
													11.8	
													11.8	
													11.6	
													11.5	
													11	
													10.7	
													1.9	

pH/Temperature Monitoring Data
Ambient Monitoring Station 8-SAR068.57
Jan 2010 to March 2015
(High Flow Months of November -- March)

Collection Date/Time	Temperature	pH
1/5/2010 12:38	0.0	7.0
3/18/2010 12:00	9.8	6.9
1/20/2011 12:40	0.8	7.3
3/22/2011 12:00	13.3	7.0
11/3/2011 12:35	8.9	7.0
1/31/2012 12:15	5.0	7.0
3/19/2012 12:00	15.2	7.2
11/27/2012 12:00	5.0	7.4
1/9/2013 13:40	3.3	7.3
3/26/2013 14:25	5.2	7.0
11/19/2013 13:14	9.1	7.3
1/14/2014 11:40	5.0	7.1
3/25/2014 11:46	5.6	7.1
12/3/2014 11:47	6.9	7.3
3/31/2015 11:41	9.2	7.1
90th Percentile	**11.9**	**7.3**

Attachment 8

FRESHWATER
WATER QUALITY CRITERIA / WASTELOAD ALLOCATION ANALYSIS

Facility Name: Louisa Regional WWTP Permit No.: VA0067954

Receiving Stream: Beaver Creek Version: OWP Guidance Memo 00-2011 (8/24/00)

Stream Information		Stream Flows		Mixing Information		Effluent Information	
Mean Hardness (as CaCO3) =	mg/L	1Q10 (Annual) =	0.003 MGD	Annual - 1Q10 Mix =	100 %	Mean Hardness (as CaCO3) =	106 mg/L
90% Temperature (Annual) =	25 deg C	7Q10 (Annual) =	0.003 MGD	- 7Q10 Mix =	100 %	90% Temp (Annual) =	23.2 deg C
90% Temperature (Wet season) =	15 deg C	30Q10 (Annual) =	0.008 MGD	- 30Q10 Mix =	100 %	90% Temp (Wet season) =	13.6 deg C
90% Maximum pH =	7.3 SU	1Q10 (Wet season) =	0.043 MGD	Wet Season - 1Q10 Mix =	100 %	90% Maximum pH =	7.6 SU
10% Maximum pH =	SU	30Q10 (Wet season)	0.08 MGD	- 30Q10 Mix =	100 %	10% Maximum pH =	SU
Tier Designation (1 or 2) =	1	30Q5 =	0.06 MGD			Discharge Flow =	0.8 MGD
Public Water Supply (PWS) Y/N? =	n	Harmonic Mean =	0.06 MGD				
Trout Present Y/N? =	n						
Early Life Stages Present Y/N? =	y						

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Acenapthene	0	--	--	na	9.9E+02	--	--	na	1.1E+03	--	--	--	--	--	--	--	--	--	--	na	1.1E+03
Acrolein	0	--	--	na	9.3E+00	--	--	na	1.0E+01	--	--	--	--	--	--	--	--	--	--	na	1.0E+01
Acrylonitrile [C]	0	--	--	na	2.5E+00	--	--	na	2.7E+00	--	--	--	--	--	--	--	--	--	--	na	2.7E+00
Aldrin [C]	0	3.0E+00	--	na	5.0E-04	3.0E+00	--	na	5.4E-04	--	--	--	--	--	--	--	--	3.0E+00	--	na	5.4E-04
Ammonia-N (mg/l) (Yearly)	0	1.71E+01	2.28E+00	na	--	1.71E+01	2.30E+00	na	--	--	--	--	--	--	--	--	--	1.71E+01	2.30E+00	na	--
Ammonia-N (mg/l) (High Flow)	0	1.76E+01	4.12E+00	na	--	1.86E+01	4.54E+00	na	--	--	--	--	--	--	--	--	--	1.86E+01	4.54E+00	na	--
Anthracene	0	--	--	na	4.0E+04	--	--	na	4.3E+04	--	--	--	--	--	--	--	--	--	--	na	4.3E+04
Antimony	0	--	--	na	6.4E+02	--	--	na	6.9E+02	--	--	--	--	--	--	--	--	--	--	na	6.9E+02
Arsenic	0	3.4E+02	1.5E+02	na	--	3.4E+02	1.5E+02	na	--	--	--	--	--	--	--	--	--	3.4E+02	1.5E+02	na	--
Barium	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Benzene [C]	0	--	--	na	5.1E+02	--	--	na	5.5E+02	--	--	--	--	--	--	--	--	--	--	na	5.5E+02
Benzidine [C]	0	--	--	na	2.0E-03	--	--	na	2.2E-03	--	--	--	--	--	--	--	--	--	--	na	2.2E-03
Benzo (a) anthracene [C]	0	--	--	na	1.8E-01	--	--	na	1.9E-01	--	--	--	--	--	--	--	--	--	--	na	1.9E-01
Benzo (b) fluoranthene [C]	0	--	--	na	1.8E-01	--	--	na	1.9E-01	--	--	--	--	--	--	--	--	--	--	na	1.9E-01
Benzo (k) fluoranthene [C]	0	--	--	na	1.8E-01	--	--	na	1.9E-01	--	--	--	--	--	--	--	--	--	--	na	1.9E-01
Benzo (a) pyrene [C]	0	--	--	na	1.8E-01	--	--	na	1.9E-01	--	--	--	--	--	--	--	--	--	--	na	1.9E-01
Bis2-Chloroethyl Ether [C]	0	--	--	na	5.3E+00	--	--	na	5.7E+00	--	--	--	--	--	--	--	--	--	--	na	5.7E+00
Bis2-Chloroisopropyl Ether	0	--	--	na	6.5E+04	--	--	na	7.0E+04	--	--	--	--	--	--	--	--	--	--	na	7.0E+04
Bis 2-Ethylhexyl Phthalate [C]	0	--	--	na	2.2E+01	--	--	na	2.4E+01	--	--	--	--	--	--	--	--	--	--	na	2.4E+01
Bromoform [C]	0	--	--	na	1.4E+03	--	--	na	1.5E+03	--	--	--	--	--	--	--	--	--	--	na	1.5E+03
Butylbenzylphthalate	0	--	--	na	1.9E+03	--	--	na	2.0E+03	--	--	--	--	--	--	--	--	--	--	na	2.0E+03
Cadmium	0	4.2E+00	1.2E+00	na	--	4.2E+00	1.2E+00	na	--	--	--	--	--	--	--	--	--	4.2E+00	1.2E+00	na	--
Carbon Tetrachloride [C]	0	--	--	na	1.6E+01	--	--	na	1.7E+01	--	--	--	--	--	--	--	--	--	--	na	1.7E+01
Chlordane [C]	0	2.4E+00	4.3E-03	na	8.1E-03	2.4E+00	4.3E-03	na	8.7E-03	--	--	--	--	--	--	--	--	2.4E+00	4.3E-03	na	8.7E-03
Chloride	0	8.6E+05	2.3E+05	na	--	8.6E+05	2.3E+05	na	--	--	--	--	--	--	--	--	--	8.6E+05	2.3E+05	na	--
TRC	0	1.9E+01	1.1E+01	na	--	1.9E+01	1.1E+01	na	--	--	--	--	--	--	--	--	--	1.9E+01	1.1E+01	na	--
Chlorobenzene	0	--	--	na	1.6E+03	--	--	na	1.7E+03	--	--	--	--	--	--	--	--	--	--	na	1.7E+03

Parameter	Background	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
(ug/l unless noted)	Conc.	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Chlorodibromomethane[C]	0	--	--	na	1.3E+02	--	--	na	1.4E+02	--	--	--	--	--	--	--	--	--	--	na	1.4E+02
Chloroform	0	--	--	na	1.1E+04	--	--	na	1.2E+04	--	--	--	--	--	--	--	--	--	--	na	1.2E+04
2-Chloronaphthalene	0	--	--	na	1.6E+03	--	--	na	1.7E+03	--	--	--	--	--	--	--	--	--	--	na	1.7E+03
2-Chlorophenol	0	--	--	na	1.5E+02	--	--	na	1.6E+02	--	--	--	--	--	--	--	--	--	--	na	1.6E+02
Chlorpyrifos	0	8.3E-02	4.1E-02	na	--	8.3E-02	4.1E-02	na	--	--	--	--	--	--	--	--	--	8.3E-02	4.1E-02	na	--
Chromium III	0	6.0E+02	7.7E+01	na	--	6.0E+02	7.8E+01	na	--	--	--	--	--	--	--	--	--	6.0E+02	7.8E+01	na	--
Chromium VI	0	1.6E+01	1.1E+01	na	--	1.6E+01	1.1E+01	na	--	--	--	--	--	--	--	--	--	1.6E+01	1.1E+01	na	--
Chromium, Total	0	--	--	1.0E+02	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Chrysene [C]	0	--	--	na	1.8E-02	--	--	na	1.9E-02	--	--	--	--	--	--	--	--	--	--	na	1.9E-02
Copper	0	1.4E+01	9.4E+00	na	--	1.4E+01	9.4E+00	na	--	--	--	--	--	--	--	--	--	1.4E+01	9.4E+00	na	--
Cyanide, Free	0	2.2E+01	5.2E+00	na	1.6E+04	2.2E+01	5.2E+00	na	1.7E+04	--	--	--	--	--	--	--	--	2.2E+01	5.2E+00	na	1.7E+04
DDD [C]	0	--	--	na	3.1E-03	--	--	na	3.3E-03	--	--	--	--	--	--	--	--	--	--	na	3.3E-03
DDE [C]	0	--	--	na	2.2E-03	--	--	na	2.4E-03	--	--	--	--	--	--	--	--	--	--	na	2.4E-03
DDT [C]	0	1.1E+00	1.0E-03	na	2.2E-03	1.1E+00	1.0E-03	na	2.4E-03	--	--	--	--	--	--	--	--	1.1E+00	1.0E-03	na	2.4E-03
Demeton	0	--	1.0E-01	na	--	--	1.0E-01	na	--	--	--	--	--	--	--	--	--	--	1.0E-01	na	--
Diazinon	0	1.7E-01	1.7E-01	na	--	1.7E-01	1.7E-01	na	--	--	--	--	--	--	--	--	--	1.7E-01	1.7E-01	na	--
Dibenz(a,h)anthracene [C]	0	--	--	na	1.8E-01	--	--	na	1.9E-01	--	--	--	--	--	--	--	--	--	--	na	1.9E-01
1,2-Dichlorobenzene	0	--	--	na	1.3E+03	--	--	na	1.4E+03	--	--	--	--	--	--	--	--	--	--	na	1.4E+03
1,3-Dichlorobenzene	0	--	--	na	9.6E+02	--	--	na	1.0E+03	--	--	--	--	--	--	--	--	--	--	na	1.0E+03
1,4-Dichlorobenzene	0	--	--	na	1.9E+02	--	--	na	2.0E+02	--	--	--	--	--	--	--	--	--	--	na	2.0E+02
3,3-Dichlorobenzidine[C]	0	--	--	na	2.8E-01	--	--	na	3.0E-01	--	--	--	--	--	--	--	--	--	--	na	3.0E-01
Dichlorobromomethane [C]	0	--	--	na	1.7E+02	--	--	na	1.8E+02	--	--	--	--	--	--	--	--	--	--	na	1.8E+02
1,2-Dichloroethane [C]	0	--	--	na	3.7E+02	--	--	na	4.0E+02	--	--	--	--	--	--	--	--	--	--	na	4.0E+02
1,1-Dichloroethylene	0	--	--	na	7.1E+03	--	--	na	7.6E+03	--	--	--	--	--	--	--	--	--	--	na	7.6E+03
1,2-trans-dichloroethylene	0	--	--	na	1.0E+04	--	--	na	1.1E+04	--	--	--	--	--	--	--	--	--	--	na	1.1E+04
2,4-Dichlorophenol	0	--	--	na	2.9E+02	--	--	na	3.1E+02	--	--	--	--	--	--	--	--	--	--	na	3.1E+02
2,4-Dichlorophenoxy acetic acid (2,4-D)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
1,2-Dichloropropane[C]	0	--	--	na	1.5E+02	--	--	na	1.6E+02	--	--	--	--	--	--	--	--	--	--	na	1.6E+02
1,3-Dichloropropene [C]	0	--	--	na	2.1E+02	--	--	na	2.3E+02	--	--	--	--	--	--	--	--	--	--	na	2.3E+02
Dieldrin [C]	0	2.4E-01	5.6E-02	na	5.4E-04	2.4E-01	5.6E-02	na	5.8E-04	--	--	--	--	--	--	--	--	2.4E-01	5.6E-02	na	5.8E-04
Diethyl Phthalate	0	--	--	na	4.4E+04	--	--	na	4.7E+04	--	--	--	--	--	--	--	--	--	--	na	4.7E+04
2,4-Dimethylphenol	0	--	--	na	8.5E+02	--	--	na	9.1E+02	--	--	--	--	--	--	--	--	--	--	na	9.1E+02
Dimethyl Phthalate	0	--	--	na	1.1E+06	--	--	na	1.2E+06	--	--	--	--	--	--	--	--	--	--	na	1.2E+06
Di-n-Butyl Phthalate	0	--	--	na	4.5E+03	--	--	na	4.8E+03	--	--	--	--	--	--	--	--	--	--	na	4.8E+03
2,4 Dinitrophenol	0	--	--	na	5.3E+03	--	--	na	5.7E+03	--	--	--	--	--	--	--	--	--	--	na	5.7E+03
2-Methyl-4,6-Dinitrophenol	0	--	--	na	2.8E+02	--	--	na	3.0E+02	--	--	--	--	--	--	--	--	--	--	na	3.0E+02
2,4-Dinitrotoluene [C]	0	--	--	na	3.4E+01	--	--	na	3.7E+01	--	--	--	--	--	--	--	--	--	--	na	3.7E+01
Dioxin 2,3,7,8-tetrachlorodibenzo-p-dioxin	0	--	--	na	5.1E-08	--	--	na	5.5E-08	--	--	--	--	--	--	--	--	--	--	na	5.5E-08
1,2-Diphenylhydrazine[C]	0	--	--	na	2.0E+00	--	--	na	2.2E+00	--	--	--	--	--	--	--	--	--	--	na	2.2E+00
Alpha-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	2.2E-01	5.6E-02	na	9.6E+01	--	--	--	--	--	--	--	--	2.2E-01	5.6E-02	na	9.6E+01
Beta-Endosulfan	0	2.2E-01	5.6E-02	na	8.9E+01	2.2E-01	5.6E-02	na	9.6E+01	--	--	--	--	--	--	--	--	2.2E-01	5.6E-02	na	9.6E+01
Alpha + Beta Endosulfan	0	2.2E-01	5.6E-02	--	--	2.2E-01	5.6E-02	--	--	--	--	--	--	--	--	--	--	2.2E-01	5.6E-02	--	--
Endosulfan Sulfate	0	--	--	na	8.9E+01	--	--	na	9.6E+01	--	--	--	--	--	--	--	--	--	--	na	9.6E+01
Endrin	0	8.6E-02	3.6E-02	na	6.0E-02	8.6E-02	3.6E-02	na	6.5E-02	--	--	--	--	--	--	--	--	8.6E-02	3.6E-02	na	6.5E-02
Endrin Aldehyde	0	--	--	na	3.0E-01	--	--	na	3.2E-01	--	--	--	--	--	--	--	--	--	--	na	3.2E-01

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Ethylbenzene	0	--	--	na	2.1E+03	--	--	na	2.3E+03	--	--	--	--	--	--	--	--	--	--	na	2.3E+03
Fluoranthene	0	--	--	na	1.4E+02	--	--	na	1.5E+02	--	--	--	--	--	--	--	--	--	--	na	1.5E+02
Fluorene	0	--	--	na	5.3E+03	--	--	na	5.7E+03	--	--	--	--	--	--	--	--	--	--	na	5.7E+03
Foaming Agents	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Guthion	0	--	1.0E-02	na	--	--	1.0E-02	na	--	--	--	--	--	--	--	--	--	--	1.0E-02	na	--
Heptachlor [c]	0	5.2E-01	3.8E-03	na	7.9E-04	5.2E-01	3.8E-03	na	8.5E-04	--	--	--	--	--	--	--	--	5.2E-01	3.8E-03	na	8.5E-04
Heptachlor Epoxide [c]	0	5.2E-01	3.8E-03	na	3.9E-04	5.2E-01	3.8E-03	na	4.2E-04	--	--	--	--	--	--	--	--	5.2E-01	3.8E-03	na	4.2E-04
Hexachlorobenzene [c]	0	--	--	na	2.9E-03	--	--	na	3.1E-03	--	--	--	--	--	--	--	--	--	--	na	3.1E-03
Hexachlorobutadiene [c]	0	--	--	na	1.8E+02	--	--	na	1.9E+02	--	--	--	--	--	--	--	--	--	--	na	1.9E+02
Hexachlorocyclohexane Alpha-BHC [c]	0	--	--	na	4.9E-02	--	--	na	5.3E-02	--	--	--	--	--	--	--	--	--	--	na	5.3E-02
Hexachlorocyclohexane Beta-BHC [c]	0	--	--	na	1.7E-01	--	--	na	1.8E-01	--	--	--	--	--	--	--	--	--	--	na	1.8E-01
Hexachlorocyclohexane Gamma-BHC [c] (Lindane)	0	9.5E-01	na	na	1.8E+00	9.5E-01	--	na	1.9E+00	--	--	--	--	--	--	--	--	9.5E-01	--	na	1.9E+00
Hexachlorocyclopentadiene	0	--	--	na	1.1E+03	--	--	na	1.2E+03	--	--	--	--	--	--	--	--	--	--	na	1.2E+03
Hexachloroethane [c]	0	--	--	na	3.3E+01	--	--	na	3.5E+01	--	--	--	--	--	--	--	--	--	--	na	3.5E+01
Hydrogen Sulfide	0	--	2.0E+00	na	--	--	2.0E+00	na	--	--	--	--	--	--	--	--	--	--	2.0E+00	na	--
Indeno (1,2,3-cd) pyrene [c]	0	--	--	na	1.8E-01	--	--	na	1.9E-01	--	--	--	--	--	--	--	--	--	--	na	1.9E-01
Iron	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Isophorone [c]	0	--	--	na	9.6E+03	--	--	na	1.0E+04	--	--	--	--	--	--	--	--	--	--	na	1.0E+04
Kepone	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	--	0.0E+00	na	--
Lead	0	1.3E+02	1.4E+01	na	--	1.3E+02	1.5E+01	na	--	--	--	--	--	--	--	--	--	1.3E+02	1.5E+01	na	--
Malathion	0	--	1.0E-01	na	--	--	1.0E-01	na	--	--	--	--	--	--	--	--	--	--	1.0E-01	na	--
Manganese	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Mercury	0	1.4E+00	7.7E-01	--	--	1.4E+00	7.7E-01	--	--	--	--	--	--	--	--	--	--	1.4E+00	7.7E-01	--	--
Methyl Bromide	0	--	--	na	1.5E+03	--	--	na	1.6E+03	--	--	--	--	--	--	--	--	--	--	na	1.6E+03
Methylene Chloride [c]	0	--	--	na	5.9E+03	--	--	na	6.3E+03	--	--	--	--	--	--	--	--	--	--	na	6.3E+03
Methoxychlor	0	--	3.0E-02	na	--	--	3.0E-02	na	--	--	--	--	--	--	--	--	--	--	3.0E-02	na	--
Mirex	0	--	0.0E+00	na	--	--	0.0E+00	na	--	--	--	--	--	--	--	--	--	--	0.0E+00	na	--
Nickel	0	1.9E+02	2.1E+01	na	4.6E+03	1.9E+02	2.1E+01	na	4.9E+03	--	--	--	--	--	--	--	--	1.9E+02	2.1E+01	na	4.9E+03
Nitrate (as N)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Nitrobenzene	0	--	--	na	6.9E+02	--	--	na	7.4E+02	--	--	--	--	--	--	--	--	--	--	na	7.4E+02
N-Nitrosodimethylamine [c]	0	--	--	na	3.0E+01	--	--	na	3.2E+01	--	--	--	--	--	--	--	--	--	--	na	3.2E+01
N-Nitrosodiphenylamine [c]	0	--	--	na	6.0E+01	--	--	na	6.5E+01	--	--	--	--	--	--	--	--	--	--	na	6.5E+01
N-Nitrosodi-n-propylamine [c]	0	--	--	na	5.1E+00	--	--	na	5.5E+00	--	--	--	--	--	--	--	--	--	--	na	5.5E+00
Nonylphenol	0	2.8E+01	6.6E+00	--	--	2.8E+01	6.6E+00	na	--	--	--	--	--	--	--	--	--	2.8E+01	6.6E+00	na	--
Parathion	0	6.5E-02	1.3E-02	na	--	6.5E-02	1.3E-02	na	--	--	--	--	--	--	--	--	--	6.5E-02	1.3E-02	na	--
PCB Total [c]	0	--	1.4E-02	na	6.4E-04	--	1.4E-02	na	6.9E-04	--	--	--	--	--	--	--	--	--	1.4E-02	na	6.9E-04
Pentachlorophenol [c]	0	7.7E-03	5.9E-03	na	3.0E+01	7.7E-03	5.9E-03	na	3.2E+01	--	--	--	--	--	--	--	--	7.7E-03	5.9E-03	na	3.2E+01
Phenol	0	--	--	na	8.6E+05	--	--	na	9.2E+05	--	--	--	--	--	--	--	--	--	--	na	9.2E+05
Pyrene	0	--	--	na	4.0E+03	--	--	na	4.3E+03	--	--	--	--	--	--	--	--	--	--	na	4.3E+03
Radionuclides	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Gross Alpha Activity (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Beta and Photon Activity (mrem/yr)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Radium 226 + 228 (pCi/L)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--
Uranium (ug/l)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	na	--

Parameter (ug/l unless noted)	Background Conc.	Water Quality Criteria				Wasteload Allocations				Antidegradation Baseline				Antidegradation Allocations				Most Limiting Allocations			
		Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH	Acute	Chronic	HH (PWS)	HH
Selenium, Total Recoverable	0	2.0E+01	5.0E+00	na	4.2E+03	2.0E+01	5.0E+00	na	4.5E+03	--	--	--	--	--	--	--	--	**2.0E+01**	**5.0E+00**	**na**	**4.5E+03**
Silver	0	3.8E+00	--	na	--	3.8E+00	--	na	--	--	--	--	--	--	--	--	--	**3.8E+00**	--	**na**	--
Sulfate	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	**na**	--
1,1,2,2-Tetrachloroethane[C]	0	--	--	na	4.0E+01	--	--	na	4.3E+01	--	--	--	--	--	--	--	--	--	--	**na**	**4.3E+01**
Tetrachloroethylene[C]	0	--	--	na	3.3E+01	--	--	na	3.5E+01	--	--	--	--	--	--	--	--	--	--	**na**	**3.5E+01**
Thallium	0	--	--	na	4.7E-01	--	--	na	5.1E-01	--	--	--	--	--	--	--	--	--	--	**na**	**5.1E-01**
Toluene	0	--	--	na	6.0E+03	--	--	na	6.5E+03	--	--	--	--	--	--	--	--	--	--	**na**	**6.5E+03**
Total dissolved solids	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	**na**	--
Toxaphene [C]	0	7.3E-01	2.0E-04	na	2.8E-03	7.3E-01	2.0E-04	na	3.0E-03	--	--	--	--	--	--	--	--	**7.3E-01**	**2.0E-04**	**na**	**3.0E-03**
Tributyltin	0	4.6E-01	7.2E-02	na	--	4.6E-01	7.2E-02	na	--	--	--	--	--	--	--	--	--	**4.6E-01**	**7.2E-02**	**na**	--
1,2,4-Trichlorobenzene	0	--	--	na	7.0E+01	--	--	na	7.5E+01	--	--	--	--	--	--	--	--	--	--	**na**	**7.5E+01**
1,1,2-Trichloroethane[C]	0	--	--	na	1.6E+02	--	--	na	1.7E+02	--	--	--	--	--	--	--	--	--	--	**na**	**1.7E+02**
Trichloroethylene [C]	0	--	--	na	3.0E+02	--	--	na	3.2E+02	--	--	--	--	--	--	--	--	--	--	**na**	**3.2E+02**
2,4,6-Trichlorophenol [C]	0	--	--	na	2.4E+01	--	--	na	2.6E+01	--	--	--	--	--	--	--	--	--	--	**na**	**2.6E+01**
2-(2,4,5-Trichlorophenoxy) propionic acid (Silvex)	0	--	--	na	--	--	--	na	--	--	--	--	--	--	--	--	--	--	--	**na**	--
Vinyl Chloride[C]	0	--	--	na	2.4E+01	--	--	na	2.6E+01	--	--	--	--	--	--	--	--	--	--	**na**	**2.6E+01**
Zinc	0	1.2E+02	1.2E+02	na	2.6E+04	1.2E+02	1.2E+02	na	2.8E+04	--	--	--	--	--	--	--	--	**1.2E+02**	**1.2E+02**	**na**	**2.8E+04**

Notes:

1. All concentrations expressed as micrograms/liter (ug/l), unless noted otherwise
2. Discharge flow is highest monthly average or Form 2C maximum for Industries and design flow for Municipals
3. Metals measured as Dissolved, unless specified otherwise
4. "C" indicates a carcinogenic parameter
5. Regular WLAs are mass balances (minus background concentration) using the % of stream flow entered above under Mixing Information.
   Antidegradation WLAs are based upon a complete mix.
6. Antideg. Baseline = (0.25(WQC - background conc.) + background conc.) for acute and chronic
   = (0.1(WQC - background conc.) + background conc.) for human health
7. WLAs established at the following stream flows: 1Q10 for Acute, 30Q10 for Chronic Ammonia, 7Q10 for Other Chronic, 30Q5 for Non-carcinogens and Harmonic Mean for Carcinogens. To apply mixing ratios from a model set the stream flow equal to (mixing ratio - 1), effluent flow equal to 1 and 100% mix.

Metal	Target Value (SSTV)
Antimony	6.9E+02
Arsenic	9.0E+01
Barium	na
Cadmium	7.1E-01
Chromium III	4.7E+01
Chromium VI	6.4E+00
Copper	5.7E+00
Iron	na
Lead	8.7E+00
Manganese	na
Mercury	4.6E-01
Nickel	1.3E+01
Selenium	3.0E+00
Silver	1.5E+00
Zinc	4.9E+01

Note: do not use QL's lower than the minimum QL's provided in agency guidance

Mixing Zone Predictions for Louisa Regional STP (Low Flow)

Effluent Flow = 0.8 MGD
Stream 7Q10 = 0.003 MGD
Stream 30Q10 = 0.008 MGD
Stream 1Q10 = 0.003 MGD
Stream slope = 0.001 ft/ft
Stream width = 12 ft
Bottom scale = 3
Channel scale = 1

Mixing Zone Predictions @ 7Q10

Depth = .4389 ft
Length = 260.55 ft
Velocity = .236 ft/sec
Residence Time = .0128 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 7Q10 may be used.

Mixing Zone Predictions @ 30Q10

Depth = .4405 ft
Length = 259.72 ft
Velocity = .2366 ft/sec
Residence Time = .0127 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 30Q10 may be used.

Mixing Zone Predictions @ 1Q10

Depth = .4389 ft
Length = 260.55 ft
Velocity = .236 ft/sec
Residence Time = .3067 hours

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 1Q10 may be used.

Mixing Zone Predictions for Louisa Regional High Flow

Effluent Flow = 0.8 MGD
Stream 7Q10 = .003 MGD
Stream 30Q10 = .078 MGD
Stream 1Q10 = .003 MGD
Stream slope = .001 ft/ft
Stream width = 12 ft
Bottom scale = 2
Channel scale = 1

Mixing Zone Predictions @ 7Q10

Depth = .3608 ft
Length = 425.3 ft
Velocity = .2871 ft/sec
Residence Time = .0171 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 7Q10 may be used.

Mixing Zone Predictions @ 30Q10

Depth = .381 ft
Length = 405.61 ft
Velocity = .2972 ft/sec
Residence Time = .0158 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 30Q10 may be used.

Mixing Zone Predictions @ 1Q10

Depth = .3608 ft
Length = 425.3 ft
Velocity = .2871 ft/sec
Residence Time = .4115 hours

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 1Q10 may be used.

WATER-EFFECT RATIO FOR COPPER CONFIRMATION STUDY

LOUISA COUNTY WATER AUTHORITY
LOUISA REGIONAL WASTEWATER TREATMENT PLANT

MAY 2015

Full Text Report
Appendix A, Sample Collection and Toxicological Data
Appendix B, Analytical Data
Appendix C, Copper Control Chart

REPORT SUBMITTED BY:

Elizabeth D. Thompson 5/26/15

SHEALY CONSULTING, LLC.
603 South Lake Drive
Lexington, South Carolina 29072

WATER-EFFECT RATIO FOR COPPER: STREAMLINED METHOD CONFIRMATION STUDY

LOUISA COUNTY WATER AUTHORITY: LOUISA REGIONAL WASTEWATER TREATMENT PLANT

MAY 2015

SECTION 1: Introduction

The Louisa County Water Authority owns and operates the Louisa Regional Wastewater Treatment Plant in Louisa, Virginia. The facility operates under NPDES permit #VA0067954, and discharges into Beaver Creek in the York River basin. The VPDES permit issued December 4, 2009, used a copper Water-Effect Ratio (WER) derived in 2008 of 15.70 to determine that copper limits were not necessary for the Louisa Regional WWTP final effluent. VADEQ has requested that a copper WER confirmation study be performed to determine if the WER derived in 2008 is still appropriate for the new permitting cycle.

The studies used to develop the copper WER for the Louisa Regional WWTP adhered to EPA 823-B-94-001, *Interim Guidance on Determination and Use of Water-Effect Ratios for Metals*, and the copper Streamlined Procedure provided in EPA 822-R-01-005, *Streamlined Water-Effect Ratio Procedure for Discharges of Copper*. For detailed acute toxicity testing guidance, *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms*, Fifth Edition, EPA 821-R-02-012, was used. The WER was determined using *Ceriodaphnia dubia*, a freshwater invertebrate in the family Cladocera.

The copper WER confirmation study was conducted March 25, 2015, using effluent and receiving stream samples collected March 24, 2015. The WER's for *C. dubia* were 6.373 for total copper, and 5.912 for dissolved copper.

Section 2: Sample Collection

2.1 Sampling Information

Compositing equipment was deployed by HRSD. A copper blank was collected from the compositing equipment prior to initiating the effluent sampling program. The compositor was initiated on March 24, 2015, at 0626, and terminated 8 hours later at 1426. The final effluent was then poured into non-preserved containers with all air space removed for transport to Shealy Consulting, LLC.

Receiving stream samples were collected approximately 20 feet upstream of the discharge pipe into Beaver Creek. Beaver Creek stream flow was taken at the time of sample collection. Two gallons of stream water was collected into non-preserved containers with head space removed for transport to Shealy Consulting, LLC.

Filtration equipment was set-up on-site for the 0.45µm filtration of receiving stream water for dissolved metals analysis. A filtration blank was collected by passing de-ionized water through the filtration apparatus and preserved for copper analysis. A sample of Beaver Creek water was then filtered and preserved with nitric acid for dissolved metals analysis, and a sample of un-filtered Beaver Creek water was preserved with nitric acid for total metals analysis. The metals samples were transported to Shealy Consulting, LLC.

All samples were packed on ice for transport to Shealy Consulting, LLC, in Lexington, South Carolina. A copy of the Chain-of-Custody form which accompanied the samples is available in Appendix A. The samples were received at Shealy Consulting, LLC, March 25, 2015, at 0915. A receipt temperature of 2.4°C was documented. The receiving stream sample was assigned the unique ID#E0512, and effluent sample was assigned the unique ID#E0514. TRC for the sample was <0.05 mg/L. The samples were stored in a refrigeration unit set between 0 and 4°C. No air space was observed in the effluent sample containers prior to use in testing.

2.2 Sampling Conditions

Louisa Regional WWTP personnel reported a plant effluent flow of 0.358 MGD for March 24, 2015. The CBOD measured in the effluent was <2 mg/L, ammonia-N was <0.20 mg/L, and TSS was 1.3 mg/L. All of these parameters were less than the permitted discharge limits, indicating that the treatment plant was operating normally during the sampling event (see Table 1).

Table 1: Louisa Regional WWTP Permit Limits

Measurement	**Effluent Collected March 24, 2015**	**Permitted Monthly Average**	**Permitted Weekly Average**
WWTP Flow	0.358 MGD	--	--
CBOD (mg/L)	< 2	10	15
Ammonia-Nitrogen (mg/L)	< 0.20	8.5 (Nov. – Mar.)	11.5 (Nov. – Mar.)
TSS (mg/L)	1.3	20	30

Weather conditions for 14 days prior to sample collection were obtained from monitoring reports for a nearby airport (KLKU). A summary of the weather conditions is provided in Appendix A. The most recent rain event prior to sample collection was on March 20, 2015.

Section 3: WER Test Procedures

3.1 Copper Source

The copper source was cupric sulfate pentahydrate ($CuSO_4*5H_2O$), ACS grade, obtained from VWR. The container of cupric sulfate was designated as SHEALY # T14-229. A primary copper stock was prepared on March 25, 2015, by adding 1.00085 g cupric sulfate pentahydrate to 1 liter de-ionized water in a volumetric flask. The stock was designated as #435.

3.2 LABWATER Test Dilutions

Laboratory dilution water was prepared March 25, 2015, and was designated MHRW-348. To prepare the moderately hard reconstituted water (MHRW), Town of Lexington drinking water was treated with mixed-bed de-ionizers, UV filtration, an ultra-filtration polishing unit, and a bacterial filter to produce Type I de-ionized water. Dilution water was prepared by adding reagents to the de-ionized water according to the procedure for obtaining moderately hard synthetic dilution water found in Section 7 of EPA 82-R-02-012, *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms*. This procedure produces water with hardness in the range of 80-100 mg/L as $CaCO_3$.

A LABWATER sub-stock of cupric sulfate was prepared March 25, 2015, by diluting 2 ml of the primary copper stock to 500 ml with MHRW-348. This provided a sub-stock with a nominal copper concentration of 1 mg/L. The test dilutions were prepared by combining the LABWATER sub-stock with un-spiked MHRW-348 to obtain the following nominal copper concentrations: 2.5, 3.9, 6.0, 9.1, 14, and 21 µg/L. Acid washed Class 'A' pipettes and cylinders were used to prepare sub-stocks and dilutions.

Table 2: Preparation of LABWATER test dilutions for the Louisa Regional WWTP WER study conducted March 25-27, 2015.

Treatment (% LABWATER Sub-stock)	Nominal Copper Concentration (µg/L)	LABWATER Sub-stock Used (ml)	Dilution
Lab. Control	0	0	To 400 ml with MHRW-348
0.25	2.5	1.0	To 400 ml with MHRW-348
0.39	3.9	1.6	To 400 ml with MHRW-348
0.60	6.0	2.4	To 400 ml with MHRW-348
0.91	9.1	3.6	To 400 ml with MHRW-348
1.4	14	5.6	To 400 ml with MHRW-348
2.1	21	8.4	To 400 ml with MHRW-348

All dilutions were prepared by 1100 on March 25, 2015. A 125 ml aliquot of each dilution was preserved with nitric acid for total copper analysis. A separate 125 ml aliquot of each dilution was filtered at 0.45 µm and preserved with nitric acid for dissolved copper analysis. The remaining solution was used for toxicity testing.

3.3 SIMSTREAM Test Dilutions

The Streamlined Procedure dictates that Simulated Stream water (SIMSTREAM) must be constructed by combining Louisa Regional WWTP final effluent and upstream receiving stream water at the design low-flow conditions (Instream Waste Concentration, or IWC). The 1Q10 of the receiving stream is 0.003 MGD, and the WWTP design flow is 0.8 MGD so the SIMSTREAM water consisted of 99.6% effluent. This was the same concentration of effluent used in the 2007-2008 WER study. The hardness value of 50 mg/L was used to normalize the test results prior to the calculation of WER values. Aliquots of LABWATER, final effluent, Beaver Creek water, and SIMSTREAM were submitted for chemical characterization.

A SIMSTREAM sub-stock of cupric sulfate was prepared by diluting 2 ml of the primary copper stock to 500 ml with SIMSTREAM. This provided a sub-stock with a nominal copper concentration of 1.0 mg/L. The test dilutions were prepared by combining the SIMSTREAM sub-stock with un-spiked SIMSTREAM to obtain the following nominal copper concentrations: 32, 49, 75, 116, 179, 275, and 423 µg/L. Acid washed Class 'A' pipettes and cylinders were used to prepare sub-stocks and dilutions.

Table 3: Preparation of SIMSTREAM test dilutions for the Louisa Regional WWTP WER study conducted March 25-27, 2015.

Treatment (% SIMSTREAM Sub-stock)	Nominal Copper Concentration (µg/L)	SIMSTREAM Sub-stock Used (ml)	Dilution
Lab. Control	0	0	MHRW-348
Receiving Stream	0	0	Beaver Creek Water
SIMSTREAM	0	0	SIMSTREAM
3.2	32	12.8	To 400 ml with SIMSTREAM
4.9	49	19.6	To 400 ml with SIMSTREAM
7.5	75	30	To 400 ml with SIMSTREAM
11.6	116	46.4	To 400 ml with SIMSTREAM
17.9	179	72	To 400 ml with SIMSTREAM
27.5	275	110	To 400 ml with SIMSTREAM
42.3	423	169	To 400 ml with SIMSTREAM

SIMSTREAM test dilutions were prepared by 1045 on March 25, 2015. A 125 ml aliquot of each dilution was preserved with nitric acid for total copper analysis. A separate 125 ml aliquot was filtered at 0.45 µm and preserved with nitric acid for dissolved copper analysis. The remaining solution was used for toxicity testing.

3.4 Toxicity Test Procedures

Test solutions were allowed to equilibrate at least 2 hours prior to test initiation. Each test treatment consisted of 4 test chambers with 5 *C. dubia* each, and one surrogate test chamber with 5 organisms to be used for water chemistry measurements only (D.O., pH, and temperature). The test chambers for the LABWATER test, the SIMSTREAM test, and all surrogates were filled with test solution and randomized on a single test board. The test organisms were introduced into chambers by rows without de-randomizing the chambers. Test organisms were introduced into test solutions at 1340 on March 25, 2015. Test organisms were from the brood designated SC1600, and were born from 1830 on March 24, 2015, to 0830 on March 25, 2015. Test organisms were fed two hours prior to the initiation of the test, but food was not introduced into actual test solutions. Dissolved oxygen, pH, and temperature were measured for each test concentration at test initiation. The test board was placed in Incubator #2 set for a temperature of 25±1°C and a cycle of 16 hours light and 8 hours dark.

At 24 hours, the test board was removed from the incubator. D.O., pH, and temperature were measured in the surrogate chambers for each test concentration. Mortality was recorded, and the test board placed back into the incubator.

The toxicity test was terminated on March 27, 2015, at 1340. Immediately after mortality was recorded, appropriate test solutions were filtered at 0.45 microns and preserved with nitric acid for dissolved copper analysis. The solutions submitted for dissolved copper analysis were all controls, the highest LABWATER and SIMSTREAM test concentrations at which there was no mortality, all test concentrations having partial mortality, and the lowest LABWATER and SIMSTREAM test concentrations having complete mortality. Dissolved oxygen, pH, and temperature were measured for each test concentration at test termination.

Section 4: WER Test Results

4.1 Analytical Profile of Test Waters

Table 4: Analytical measurements for laboratory dilution water, Louisa Regional WWTP final effluent, receiving stream water, and SIMSTREAM for the WER study conducted March 25-27, 2015. Full analytical reports including complete metal scans are available in Appendix B.

Parameter	LABWATER	Final Effluent	Receiving Stream	SIMSTREAM
CBOD		<2.0 mg/L		
Ammonia-N	<0.10 mg/L	<0.20 mg/L	<0.10 mg/L	0.4 mg/L
TOC	<1.0 mg/L	6.3 mg/L	3.7 mg/L	6.1 mg/L
DOC	<1.0 mg/L	5.5 mg/L	3.2 mg/L	5.1 mg/L
Specific Conductance	349 µmhos/cm	607 µmhos/cm	142 µmhos/cm	601 µmhos/cm
TSS	<1.0 mg/L	1.3 mg/L	4.3 mg/L	1.9 mg/L
Alkalinity	56 mg/L	88 mg/L	27 mg/L	83 mg/L
Hardness	92 mg/L	116 mg/L	37 mg/L	128 mg/L
Total Copper	<1.0 µg/L	3.6 µg/L	1.6 µg/L	3.6 µg/L
Dissolved Copper	<1.0 µg/L	4.8 µg/L	1.1 µg/L	2.8 µg/L

4.2 Toxicity Test Results

Test reports for the LABWATER and both SIMSTREAM tests are available in Appendix A. All water chemistry parameters were within the expected ranges. Temperature remained within 25± 1°C, and D.O. remained above the required 6.0 mg/L. Survival was ≥90% in the laboratory dilution water controls and un-spiked SIMSTREAM treatment. Table 5 provides a summary of temperature and D.O. measurements taken during the tests. Table 6 provides a summary of the LABWATER test data, and Table 7 provides a summary of the SIMSTREAM test data.

Table 5: Summary of temperature and dissolved oxygen measurements taken during the *C. dubia* tests for the Louisa Regional WWTP WER study conducted March 25-27, 2015.

Test	Temperature Range (°C)	Average Temperature (°C)	D.O. Range (mg/L)	Average D.O. (mg/L)
LABWATER	24.0 - 25.4	24.5	7.89 - 8.96	8.37
SIMSTREAM	24.0 – 25.2	24.4	7.95 - 8.95	8.34

Table 6: Summary of toxicity test results and actual metal measurements for the Louisa Regional WWTP LABWATER test with *C. dubia* conducted March 25-27, 2015.

Treatment (% LABWATER Sub-stock)	Initial Concentration Copper Total / Dissolved (µg/L)	Final Concentration Copper Dissolved (µg/L)	Mortality at 48 Hours
Lab Control	<1.0 / <1.0	<1.0	5%
0.25	2.2 / 1.9	*	0%
0.39	3.8 / 3.3	*	0%
0.60	5.3 / 4.6	3.6	0%
0.91	8.3 / 7.3	6.7	15%
1.4	12 / 11	9.6	25%
2.1	18 / 17	15	100%

* Analysis of final dissolved copper is not required for this test concentration.

Table 7: Summary of toxicity test results and actual metal measurements for the Louisa Regional WWTP SIMSTREAM test with *C. dubia* conducted March 25-27, 2015.

Treatment (% SIMTREAM Sub-stock)	Initial Concentration Copper Total / Dissolved (µg/L)	Final Concentration Copper Dissolved (µg/L)	Mortality at 48 Hours
Lab Control	<1.0 / <1.0	1.1	5%
Receiving Stream	1.6 / 1.1	1.4	0%
SIMSTREAM	3.6 / 2.8	3.5	0%
3.2	34 / 31	*	0%
4.9	49 / 45	*	0%
7.5	80 / 73	65	0%
11.6	110 / 100	91	5%
17.9	180 / 150	140	30%
27.5	280 / 240	200	100%
42.3	410 / 350	*	100%

* Analysis of final dissolved copper is not required for this test concentration.

4.3 Copper WER Calculation

EC50's were determined using measured total and dissolved copper values for test concentrations. The Trimmed Spearman-Karber Method (TOXCALC v5.0.23) was used to determine 48-hour EC50 values for the LABWATER and SIMSTREAM tests. A standard hardness of 50 mg/L was used to normalize all EC50 data prior to the calculation of WER values.

The EC50 for total copper in the LABWATER test was 12.70 µg/L. The EC50 was normalized from the reported hardness of 92 mg/L to a standard hardness of 50 mg/L using the published slope for copper of 0.9422, (EPA 2002). The normalized value became 7.150 µg/L total copper. The EC50 value for dissolved copper was 11.60 µg/L, and was normalized to 6.531 µg/L.

The EC50 for total copper in the SIMSTREAM test was 193.0 µg/L. The EC50 was normalized from the reported hardness of 128 mg/L to a standard hardness of 50 mg/L using the published slope for copper of 0.9422, (EPA 2002). The normalized value became 79.60 µg/L total copper. The EC50 value for dissolved copper was 165.0 µg/L, and was normalized to 68.05 µg/L.

The Streamlined Procedure requires that the WER be calculated by dividing the SIMSTREAM LC50 by the greater of either the LABWATER LC50 or the published SMAV (species mean acute value). For *C. dubia*, the SMAV for total copper at a hardness of 50 mg/L is 12.49 µg/L, (EPA 2001). The SMAV for dissolved copper at a hardness of 50 mg/L is 11.51 µg/L (EPA 2001). Since the published SMAV values are greater than the EC50 values derived from this study, they were used to calculate the total and dissolved WER values. The total copper WER value for the study conducted March 25, 2015, with *C. dubia*, is 6.373. The dissolved copper WER for the study is 5.912. Table 8 provides a summary of the results.

Table 8: LABWATER and SIMSTREAM copper EC50 values, the associated normalized values, and the calculated copper WER values for the Louisa Regional WWTP study conducted March 25-27, 2015, with *Ceriodaphnia dubia*.

	EC50 (µg/L Copper)		EC50 (µg/L Copper) Hardness normalized to 50 mg/L as $CaCO_3$		WER (EC50/SMAV)	
Test	total	dissolved	total	dissolved	total	dissolved
LABWATER	12.70	11.60	7.150	6.531		
SIMSTREAM	193.0	165.0	79.60	68.05	**6.373**	**5.912**

Section 5: Test Result Comparison

Table 9: Values published in EPA 2001 for copper toxicity to *Ceriodaphnia dubia*. The values listed were generated with *C. dubia* <24 hours old, at static conditions, and using measured copper values.

REFERENCE	HARDNESS USED IN STUDY (MG/L)	EC50 (UG/L)	EC50 NORMALIZED TO HARDNESS OF 25 MG/L
Diamond, W.F. 2000.	78	13.1	4.48
	90	8.88	2.66
	90	10.3	3.08
Tetra Tech. 1998	99	10.1	2.76
	70	14.65	5.55
	74	6.72	2.42
	72	6.59	2.43
Diamond et al. 1997b.	80	6.98	2.33
Neserke, G. 1994.	87.5	11.25	3.46
	80.8	13.17	4.36
	80.8	25.25	8.36
	60	11.25	4.93
	30	4.5	3.79

The values listed in EPA 2001 were included in this summary only if they were generated using three criteria: 1) the *C. dubia* tested were less than 24 hours old, 2) the test was conducted under static conditions, and 3) measured copper values were used to determine EC50s. Using the hardness-normalized values, the average total copper EC50 for the EPA values is 3.89 µg/L. The upper limit using 2 standard deviations is 7.29 µg/L, and the lower limit is 0.49 µg/L.

A copy of the Shealy Consulting reference control chart for copper is included as Appendix C. The control chart includes all copper studies in LABWATER from September 15, 2010, through October 22, 2015. The control chart mean is 2.85 µg/L, with an upper limit of 4.32 µg/L and a lower limit of 1.37 µg/L.

Table 10 provides the *C.dubia* EC50 data from the Louisa Regional WWTP WER study performed March 25, 2015, the EPA published copper EC50 values, and Shealy Consulting, LLC, copper EC50 data.

Table 10: Comparison of EC50 values generated for *C. dubia* <24 hours old. All studies referenced were generated under static conditions with EC50 values calculated using measured total copper. All EC50 values are normalized to a hardness of 25 mg/L.

Study/Facility	Mean EC50 Value (µg/L)	Range (2SD) (µg/L)
Shealy Consulting, LLC.	2.85	1.37 – 4.32
Values Published in EPA 2001	3.893	0.49-7.29
Louisa Regional WWTP WER Study	3.721	

Section 6: Blank Analysis Results

Blanks were collected for copper analysis at various points during the WER studies.

The following blanks resulted in copper detections:

- The HRSD field blank for the effluent collection equipment resulted in a total copper value of 1.77 µg/L.
- The SIMSTREAM filtration blank or initial copper concentrations resulted in a dissolved copper value of 1.2 µg/L.

All other laboratory equipment blanks and filtration blanks resulted in copper values of < 1 µg/L copper.

Section 7: References

APHA (2012) Standard Methods for the Examination of Water and Wastewater. 22nd Edition. Prepared and published jointly by: APHA, AWWA, and WEF.

US Environmental Protection Agency (1994). Interim Guidance on Determination and Use of Water-Effect Ratios for Metals. EPA 823-B-94-001. Office of Water, Washington, D.C.

US Environmental Protection Agency (1995). 1995 Updates: Water Quality Criteria Documents for the Protection of Aquatic Life in Ambient Water. EPA 820-B-96-001. Office of Water, Washington, D.C.

US Environmental Protection Agency (2001). Streamlined Water-Effect Ratio Procedure for Discharges of Copper. EPA-822-R-01-005. Office of Water, Washington, D.C.

US Environmental Protection Agency (2002). Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms. Fifth Edition EPA 821-R-02-012. Environmental Research Laboratory, Duluth, MN.

US Environmental Protection Agency (2009). National Recommended Water Quality Criteria: 2009. Office of Water, Washington, D.C.

9 VAC 25-260 (2011). Virginia Water Quality Standards with Amendments Effective January 6, 2011. State of Virginia Water Control Board.

Westernik, Anna (DEQ)

From: Barron, Alex (DEQ)
Sent: Thursday, June 18, 2015 1:58 PM
To: Westernik, Anna (DEQ)
Cc: Whitehurst, David (DEQ); Kennedy, John (DEQ)
Subject: RE: Regional WWTP Copper Weir Question

Hi Anna;

I have reviewed the report you passed on to me this Monday from Shealy Consulting on a confirmation copper –Water Effect Ratio (WER), dated May , 2015 and titled ; "Louisa County Water Authority Louisa regional Wastewater Treatment Plant and I have reviewed the attached QA/QC data. This study was done in relation to VPDES Permit # 0067954 and was conducted to confirm that a Water Effect Ratio for copper exists for this effluent and receiving stream. The study was well done and meets all requirements for a streamlined-copper WER study.

~~This study produced a valid **copper WER of 6.373** based on total copper analytical measurements~~

This is somewhat less than the copper –WER established for this Permit in 2008, but it nevertheless is a significant WER.

If a WER of 6.373 is sufficient for you to conclude that there is no reasonable potential for this permitted discharge to exceed the standard, hardness adjusted Virginia Water Quality Criteria multiplied by 6.373, then this study is complete and no further testing is needed. This report, taken in addition to the original, more comprehensive study conducted in 2007-2008 provide valid evidence that the chemical and physical characteristics of the effluent from VPDES Permit # 0067954 have a detoxifying effect on copper, and a WER of at least 6.373 can be attributed to this effluent.

Please let me know if you need additional information.

Alex

From: Barron, Alex (DEQ)
Sent: Monday, June 08, 2015 7:32 AM
To: Westernik, Anna (DEQ)
Subject: RE: Regional WWTP Copper Weir Question

Hi Anna. I haven't heard anything from them sense the April 27th meeting.

From: Westernik, Anna (DEQ)
Sent: Friday, June 05, 2015 10:46 AM
To: Barron, Alex (DEQ)
Subject: RE: Regional WWTP Copper Weir Question

Alex,

Could you update me on the status of this WER?

Anna

From: Barron, Alex (DEQ)
Sent: Tuesday, April 21, 2015 2:33 PM
To: Westernik, Anna (DEQ)
Subject: RE: Regional WWTP Copper Weir Question

I think that is the way to proceed. I'll write an e-mail explaining that they need to confirm their own data and submit it to us, and then we can proceed. I'll indicate that our preliminary review suggests that this may be adequate, but we need to confirm this based on the actual report and QA QC information.

I'll send it to you for a review before copying everyone. Might be tomorrow morning, I have a couple of other issues here to deal with today.

From: Westernik, Anna (DEQ)
Sent: Tuesday, April 21, 2015 2:28 PM
To: Barron, Alex (DEQ)
Subject: RE: Regional WWTP Copper Weir Question

Alex,

It would be a great idea for them to confirm and submit their data. Then I can review the limits in detail.

Anna

From: Barron, Alex (DEQ)
Sent: Tuesday, April 21, 2015 2:25 PM
To: Westernik, Anna (DEQ)
Subject: RE: Regional WWTP Copper Weir Question

Thanks. That is encouraging news. That is the ultimate answer we are attempting to answer; is a permit limited needed or not. If no limit is needed, then we don't need to be too concerned with requiring additional tests to improve accuracy of the WER..

If using the new WER of 6.373 there would still be no reasonable potential for an exceedence of the copper criterion, then the new WER of 6.373 could still justify no permit limit needed. This would allow us to conclude that there is no further testing needed at this time.

Of course, Shealy will need to finish their QA QC and confirm the accuracy of their tests. Maybe we should we ask them to confirm and submit their data before you spend any more time on this issue? That way we would only have to do the careful analysis once.. Then when you get a chance, you can reevaluate the stream flows and whatever you need to.

From: Westernik, Anna (DEQ)
Sent: Tuesday, April 21, 2015 12:30 PM would act as confirmation
To: Barron, Alex (DEQ)
Subject: RE: Regional WWTP Copper Weir Question

Alex,

Used the criteria determined during the last permit cycle and a copper monitoring data point from 3/14, the answer is no. However, I still would have to re-evaluate stream flows, etc. to be totally accurate.

Anna

From: Barron, Alex (DEQ)
Sent: Tuesday, April 21, 2015 7:04 AM
To: Westernik, Anna (DEQ)
Subject: RE: Regional WWTP Copper Weir Question

Hi Anna.

If a WER of 6.373 is used for this permit, would there be a reasonable potential to exceed the copper criterion and a permit limit will be needed?

Thanks

Alex

From: Westernik, Anna (DEQ)
Sent: Monday, April 20, 2015 8:21 AM
To: Barron, Alex (DEQ)
Subject: FW: Regional WWTP Copper Weir Question

Good Morning Alex,

What are your thoughts?

Anna

From: Wesley Basore [mailto:wbasore@louisa.org]
Sent: Friday, April 17, 2015 4:04 PM
To: Westernik, Anna (DEQ)
Subject: Regional WWTP Copper Weir Question

Anna,

Shealy Consulting, LLC completed the WER copper analysis yesterday. It looks like the WER on this study is 6.369. This value is about half of the value that we got in the 2008 study. The result is preliminary but it is expected to be a true number. The downstream simulated hardness was 128 mg/L for this test and 57 mg/L for the 2008 study. When the hardness is adjusted for the current test to the 57 used in 2008 the result is 14 which is what the 2008 study showed. The question we have is how does the 6.369 effect the permit limit for copper? Do we need to do a full study? Please let me know if you need any further information.

Thanks,

Wesley

8/25/2015 8:42:57 AM

Facility = Louisa Regional WWTP
Chemical = Ammonia (Apr - Oct)
Chronic averaging period = 30
WLAa = 17
WLAc = 2.3
Q.L. = .2
# samples/mo. = 12
# samples/wk. = 3

Summary of Statistics:

observations = 1
Expected Value = 9
Variance = 29.16
C.V. = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average= 10.8544
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 4.64064121485751
Average Weekly limit = 3.39436778020437
Average Monthly LImit = 2.52836033667815

The data are:

9

9/11/2015 1:15:28 PM

Facility = Louisa Regional WWTP
Chemical = Ammonia (Nov - Mar)
Chronic averaging period = 30
WLAa = 19
WLAc = 4.6
Q.L. = .2
# samples/mo. = 12
# samples/wk. = 3

Summary of Statistics:

observations = 1
Expected Value = 9
Variance = 29.16
C.V. = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average= 10.8544
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 9.28128242971503
Average Weekly limit = 6.78873556040874
Average Monthly LImit = 5.0567206733563

The data are:

9

4/12/2007 9:49:44 AM

Facility = Louisa Regional 0.8
Chemical = Ammonia as N (May-Oct)
Chronic averaging period = 30
WLAa = 59
WLAc = 4.6
Q.L. = 0.2
# samples/mo. = 12
# samples/wk. = 3

Summary of Statistics:

observations = 1
Expected Value = 9
Variance = 29.16
C.V. = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average= 10.8544
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 9.28128242971503
Average Weekly limit = 6.78873556040874
Average Monthly LImit = 5.0567206733563

The data are:

9

4/12/2007 9:49:15 AM

Facility = Louisa Regional 0.8
Chemical = Ammonia as N (Nov-Apr)
Chronic averaging period = 30
WLAa = 61
WLAc = 7.8
Q.L. = 0.2
# samples/mo. = 12
# samples/wk. = 3

Summary of Statistics:

observations = 1
Expected Value = 9
Variance = 29.16
C.V. = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average= 10.8544
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 15.7378267286472
Average Weekly limit = 11.5113342111279
Average Monthly Limit = 8.57443940264764

The data are:

9

12/31/03 6:37:20 AM

Facility = Louisa Regional STP
Chemical = Ammonia as Nitrogen (Summer)
Chronic averaging period = 30
WLAa = 17.16
WLAc = 2.04
Q.L. = .2
# samples/mo. = 12
# samples/wk. = 3

Summary of Statistics:

observations = 1
Expected Value = 9
Variance = 29.16
C.V. = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average= 10.8544
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 4.11604699056927
Average Weekly limit = 3.01065663983344
Average Monthly LImit = 2.24254568992323

The data are:

9

12/31/03 6:37:56 AM

Facility = Louisa Regional STP
Chemical = Ammonia as Nitrogen (Winter)
Chronic averaging period = 30
WLAa = 18.86
WLAc = 4.39
Q.L. = .2
# samples/mo. = 12
# samples/wk. = 3

Summary of Statistics:

observations = 1
Expected Value = 9
Variance = 29.16
C.V. = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average= 10.8544
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 8.8575717100976
Average Weekly limit = 6.4788150239553
Average Monthly LImit = 4.82587038174656

The data are:

9

7/14/2015 2:08:19 PM

Facility = Louisa Regional WWTP
Chemical = Total Recoverable Copper
Chronic averaging period = 4
WLAa = 93
WLAc = 62
Q.L. = .5
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 3
Expected Value = 2.4
Variance = 2.0736
C.V. = 0.6
97th percentile daily values = 5.84020
97th percentile 4 day average = 3.99309
97th percentile 30 day average= 2.89452
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:

1.97
2.31
2.92

7/14/2015 2:42:34 PM

Facility = Lousisa Regional STP
Chemical = Total Recoverable Zinc
Chronic averaging period = 4
WLAa = 120
WLAc = 120
Q.L. = 10
# samples/mo. = 1
# samples/wk. = 1

Summary of Statistics:

observations = 7
Expected Value = 47.5142
Variance = 812.738
C.V. = 0.6
97th percentile daily values = 115.622
97th percentile 4 day average = 79.0538
97th percentile 30 day average= 57.3047
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

No Limit is required for this material

The data are:

47
42
80
44
34
42.6
43

Louisa Regional WWTP (Total Recoverable Zinc Data)
Permit #:VA0067954
Dec 2009 -- May 2015

Due	CONC AVG	CONC MAX	Limit Monthly/Max
10-Jan-10	65	90	100
10-Feb-10	70	70	100
10-Mar-10	75	110	100
10-Apr-10	70	70	100
10-May-10	90	90	100
10-Jun-10	0	0	100
10-Jul-10	130	130	100
10-Aug-10	140	140	100
10-Sep-10	140	140	100
10-Oct-10	109	109	100
10-Nov-10	104	104	100
10-Dec-10	87	87	100
10-Jan-11	79	79	100
10-Feb-11	114	114	100
10-Mar-11	81	81	100
10-Apr-11	50	50	100
10-May-11	68	68	100
10-Jun-11	80	80	100
10-Jul-11	97	97	100
10-Aug-11	108	108	100
10-Sep-11	74	92	100
10-Oct-11	53	68	100
10-Nov-11	82	82	100
10-Dec-11	74	74	100
10-Jan-12	66	67	100
10-Feb-12	61	61	100
10-Mar-12	92	92	100
10-Apr-12	50	50	100
10-May-12	19	19	100
10-Jun-12	29	37	100
10-Jul-12	59	59	100
10-Aug-12	41	41	100
10-Sep-12	30	30	100
10-Oct-12	45	45	100
10-Nov-12	102	102	100
10-Dec-12	74	74	100
10-Jan-13	105	105	100
10-Feb-13	78	78	100
10-Mar-13	98	98	100
10-Apr-13	43	43	100
10-May-13	61	61	100
10-Jun-13	31	31	100
10-Jul-13	40	40	100
10-Aug-13	34	34	100
10-Sep-13	39	39	100
10-Oct-13	54	54	100

Attachment 11

Due	CONC AVG	CONC MAX	Limit Monthly/Max
10-Nov-13	53	53	100
10-Dec-13	68	68	100
10-Jan-14	42	42	100
10-Feb-14	47	47	100
10-Mar-14	37	37	100
10-Apr-14	52	52	100
10-May-14	26	26	100
10-Jun-14	76	76	100
10-Jul-14	76	76	100
10-Aug-14	50	50	100
10-Sep-14	36	36	100
10-Oct-14	29	29	100
10-Nov-14	32	32	100
10-Dec-14	47	47	100
10-Jan-15	42	42	100
10-Feb-15	80	80	100
10-Mar-15	44	48	100
10-Apr-15	34	47	100
10-May-15	42.6	45	100
10-Jun-15	43	50	100

Period After the Issuance of the CTO for the 0.8 MGD Facility

METAL TRANSLATOR FOR ZINC

LOUISA COUNTY WATER AUTHORITY
LOUISA REGIONAL WASTEWATER TREATMENT PLANT

JUNE 2015

Full Text Report
Appendix A, Analytical Reports
Appendix B, Weather Monitoring Spreadsheets

REPORT SUBMITTED BY:

Elizabeth D. Thompson

SHEALY CONSULTING, LLC.
603 South Lake Drive
Lexington, South Carolina 29072

Attachment 12

SITE SPECIFIC METAL LIMIT DEVELOPMENT: TRANSLATOR STUDY FOR ZINC

LOUISA COUNTY WATER AUTHORITY: LOUISA REGIONAL WASTE WATER TREATMENT PLANT

JUNE 2015

SECTION 1: Introduction

The Louisa County Water Authority owns and operates the Louisa Regional Wastewater Treatment Plant in Louisa, Virginia. The facility operates under NPDES permit #VA0067954, and discharges into Beaver Creek in the York River basin. The discharge permit currently includes a limit for zinc of 100 µg/L, monthly and weekly average. Concerns regarding compliance with this limit prompted the Louisa County Water Authority to consider site-specific methods for zinc limit development.

The Water Quality Criteria used to develop metals limits apply to the entire United States, and the US Environmental Protection Agency (USEPA) understands that they are overly protective at many sites. The EPA has developed and published methods that allow the re-evaluation of these criteria on a site-specific basis, which will result in increased final limits in most cases. There are several published options approved by the USEPA for use in developing site-specific metal limits. The first option is the Water-Effect Ratio, a procedure that works well with many metals, but not for zinc. The second option is the Recalculation Procedure, which can work well for zinc in many cases, but which is currently not approved for use by the Virginia Department of Environmental Quality (VADEQ). A third option is the Metal Translator procedure.

The metal translator estimates the fraction of the total discharged metal that will subsequently be dissolved and bioavailable in the receiving stream. In order to directly develop a site-specific conversion factor, or translator, dissolved and total metal concentrations are measured in water representing completely mixed receiving stream water and effluent during low-flow conditions. The translator is the ratio of dissolved to total metal concentration, and is calculated as the central tendency of ratio values developed for numerous sampling events.

This report provides data from ten sampling events that occurred March 3 through May 12, 2015. The final translator was calculated as the geometric mean of the translators derived for the site, and was 0.94. Sample collection and analysis was conducted by the Hampton Roads Sanitation District (VELAP#460011). Data analysis and the calculation of the translator were conducted by Shealy Consulting, LLC (VELAP # 460190).

Section 2: Study Objective

The objective of this study was to derive a site-specific metal translator for zinc for the Louisa Regional WWTP outfall 001 which discharges into Beaver Creek. Samples of Louisa Regional WWTP final effluent and upstream receiving water were collected and combined to represent completely mixed downstream water. The ratio of effluent to receiving stream water in the simulated downstream mixture was derived using a receiving stream 1Q10 of 0.003 MGD and the design flow for the WWTP of 0.8 MGD. The simulated downstream samples (SIMSTREAM) were analyzed for total and dissolved zinc, hardness, and total suspended solids. The translator was calculated as the geometric mean of the ratios of dissolved to total zinc measurements for all sample pairs.

Section 3: Methods

2.1 Sample Conditions

In order to collect samples for the development of a translator, the following conditions were met:

- Flows approached permit design-flow conditions. This was achieved by documenting plant flow and weather conditions.
- The WWTP was operating within permitted specifications. With each sampling event the following final effluent parameters were analyzed: CBOD, TSS, and ammonia-N. If these analyses were in-range, there was confirmation that the WWTP was operating within permitted specifications. Table 1 provides the permitted limits for the parameters measured.

Table 1: Town of Louisa Regional WWTP Permit Limits

Measurement	Permitted Monthly Average	Permitted Weekly Average
WWTP Flow (Design Flow)	0.8 MGD	0.8 MGD
CBOD (mg/L)	10	15
Ammonia-Nitrogen (mg/L)	5.1 (April-October) 8.5 (November-March)	6.8 (April-October) 11.5 (November-March)
TSS (mg/L)	20	30

2.2 Sample Locations

Samples were collected from two locations. Final effluent was collected in the post-treatment aeration flume just after disinfection. Receiving stream water was collected from Beaver Creek approximately 10 feet upstream from the discharge pipe, just after water from the golf course culvert joins the creek.

2.3 Sampling Procedures

The Hampton Roads Sanitation District conducted all sample collections, mixing, and analysis for the zinc translator study. A specially equipped mobile laboratory was transported to the site for the duration of the project. This mobile laboratory provided a 'clean' workspace for constructing the simulated downstream mix (SIMSTREAM) and for filtering samples in preparation for dissolved zinc analysis.

Final effluent was collected as an 8-hour composite. "Clean" hands / "dirty" hands procedures were used in handling samples. Flow, temperature, and pH were documented for the final effluent. Final effluent was taken from the compositor to the mobile laboratory and aliquots were appropriately preserved for the following analyses: $CBOD_5$, TSS, total zinc and ammonia. An aliquot was filtered through a 0.45µm filter capsule for dissolved zinc analysis within 15

minutes of sample collection. An aliquot was retained in the mobile laboratory for use in creating the SIMSTREAM sample.

Receiving stream samples were collected from a station located upstream from the discharge pipe (see Section 2.2 for details). "Clean" hands / "dirty" hands procedures were used in handling samples. Flow, temperature, and pH were documented for the receiving stream, and a visual inspection of the receiving stream was used to verify that visible particulate matter was not present. Receiving stream water was pumped directly through a 0.45µm capsule filter for dissolved zinc analysis. Receiving stream water was also collected for the analysis of total zinc, TSS, and hardness. An aliquot of receiving stream water was taken to the mobile laboratory for use in creating the SIMSTREAM sample.

The SIMSTREAM sample was created by combining final effluent and receiving stream water in proportions that reflect design-flow conditions. The 1Q10 for the facility is 0.003 MGD and the design flow of the WWTP is 0.8 MGD, so the SIMSTREAM was comprised of 99.6% final effluent and 0.4% receiving stream water. The SIMSTREAM was prepared using acid-washed cylinders and glassware. "Clean" hands / "dirty" hands procedures were also used in handling samples. The pH and temperature of the SIMSTREAM was documented. Filtration of the SIMSTREAM through a 0.45µm capsule filter occurred within 15 minutes of sample preparation. Unfiltered SIMSTREAM was collected and appropriately preserved for the analysis of total zinc, TSS, and hardness.

2.4 Quality Control Procedures

'Clean' hands / 'Dirty' hands procedures were used during sample collection and SIMSTREAM mixing. Field blanks were collected and analyzed for total zinc prior to the collection of final effluent and receiving stream. Field blanks were collected and analyzed for dissolved zinc prior to the filtration of receiving stream and SIMSTREAM.

Total and dissolved zinc for one sampling event (May 5, 2015) were analyzed in duplicate to confirm method accuracy.

Section 3: Results

3.1 Monitoring Results

The sampling conditions are summarized below for each of the ten sampling events. All results indicate that the WWTP was operating normally during all sampling events. No visible particulate matter was observed in upstream water samples for all three of the sampling events. Beaver Creek average annual flow is Table 2 provides the monitoring data collected for the sampling events. Final analytical reports are provided in Appendix A.

Table 2: Operational Conditions for the Zinc Translator Sampling Events.

Sample Date	WWTP Flow (MGD)	Beaver Creek Flow (cfs)	$CBOD_5$ (mg/L)	Ammonia-N (mg/L)	TSS (mg/L)
March 3, 2015	0.387	4.77	3	<0.20	2.8
March 17, 2015	0.442	3.07	<2	<0.20	1.0
March 24, 2015	0.358	3.23	<2	<0.20	1.3
April 16, 2015	0.385	3.37	<2	<0.20	1.9
April 23, 2015	0.295	2.46	<2	2.18	1.4
April 29, 2015	0.288	1.59	<2	0.32	1.9
May 5, 2015	0.315	1.90	<2	<0.20	4.0
May 7, 2015	0.333	2.69	<2	0.48	2.6
May 12, 2015	0.304	1.85	<2	<0.20	1.4
May 14, 2015	0.297	0.96	3	1.42	5.4

Weather conditions were monitored and the spreadsheets are provided in Appendix B. In order to sample when flow conditions approached design-flow levels, the study plan designated the criterion of not having $\geq$0.25 inches of rain in the 72 hours prior to sampling. Heavy snow and freezing conditions delayed sampling until March 3, 2015. Since all data had to be generated by June 1, 2015, we were not able to always meet this criterion. Instead, the wastewater treatment plant flow and monitoring data were used to determine normal flow events.

3.2 Quality Control Results

Table 3 provides the results of all field blank analyses. Most field blanks were at or below the detection limit of 1 µg/L. All measurements were below 5 µg/L except the March 24, 2015, final effluent blank, which was 6.08 µg/L. Analytical reports are available in the Appendix.

Table 3: Field Blank Analyses for the Louisa Regional WWTP Zinc Translator Study

Sample Date	Final Effluent Field Blank Total Zinc (µg/L)	Receiving Stream Field Blank Total Zinc (µg/L)	Receiving Stream Field Blank Dissolved Zinc (µg/L)	SIMSTREAM Field Blank Dissolved Zinc (µg/L)
March 3, 2015	1.18	<1.0	<1.00	<1.00
March 17, 2015	2.49	<1.0	<1.00	<1.00
March 24, 2015	6.08	<1.0	<1.00	1.75
April 16, 2015	1.09	1.62	<1.00	<1.00
April 23, 2015	<1.00	<1.00	<1.00	<1.00
April 29, 2015	<1.00	<1.00	<1.00	<1.00
May 5, 2015	<1.00	<1.00	<1.00	<1.00
May 7, 2015	<1.00	<1.00	<1.00	<1.00
May 12, 2015	<1.00	<1.00	<1.00	<1.00
May 14, 2015	<1.00	<1.00	<1.00	<1.00

A duplicate sample was collected, processed, and analyzed for total and dissolved zinc on May 5, 2015. Table 4 provides the duplicate analysis results.

Table 4: Duplicate Analyses for the Louisa Regional WWTP Zinc Translator Study

Sample Date	Total Zinc (µg/L)	Dissolved Zinc (µg/L)
May 5, 2015	28.9	26.7
May 5, 2015 (Dup)	28.6	27.4
% Difference	1%	2.6%

Section 4: Calculation of the Zinc Translator

Table 5 provides the total and dissolved zinc results for the water samples. All SIMSTREAM data sets were acceptable for use in the calculation of the translator as they complied with the following:

- Data were above the reporting limit of 1.0 µg/L,
- Operating conditions of the Louisa Regional WWTP were in compliance with monitoring limits.

Table 5: Total and Dissolved Zinc Results for the Louisa Regional WWTP Zinc Translator Study

Sample Date	Receiving Stream Total Zinc (µg/L)	Receiving Stream Dissolved Zinc (µg/L)	SIMSTREAM Total Zinc (µg/L)	SIMSTREAM Dissolved Zinc (µg/L)
March 3, 2015	9.45	8.33	37.3	35.2
March 17, 2015	6.96	5.85	48.1	43.7
March 24, 2015	5.26	4.32	55.8	50.8
April 16, 2015	6.09	4.91	34.4	33.4
April 23, 2015	9.09	4.34	33.4	31.7
April 29, 2015	2.96	1.55	25.9	25.2
May 5, 2015	5.12	3.24	28.9	26.7
May 7, 2015	4.16	3.26	27.5	25.7
May 12, 2015	5.98	3.42	38.2	37.7
May 14, 2015	3.14	2.20	26.4	25.3

The translator was calculated for each SIMSTREAM sample as the ratio of dissolved zinc to total zinc. Table 5 provides the zinc results and calculated translator.

Table 6: Zinc Translators Calculated for the Louisa Regional WWTP

Sample Date	Total Zinc (µg/L)	Dissolved Zinc (µg/L)	Translator
March 3, 2015	37.3	35.2	0.94
March 17, 2015	48.1	43.7	0.91
March 24, 2015	55.8	50.8	0.91
April 16, 2015	34.4	33.4	0.97
April 23, 2015	33.4	31.7	0.95
April 29, 2015	25.9	25.2	0.97
May 5, 2015	28.9	26.7	0.92
May 5, 2015 (Dup)	28.6	27.4	0.96*
May 7, 2015	27.5	25.7	0.93
May 12, 2015	38.2	37.7	0.99
May 14, 2015	37.3	35.2	0.94

* Duplicate value not used in the calculation of the zinc translator.

The geometric mean of the translator values is **0.94**. This is the final translator based on the results of the three sampling events. This indicates that the total zinc is comprised of 94% dissolved zinc. The final zinc limit would be raised about 6%. The limit of 100 µg/L would become approximately 106 µg/L.

Section 5: References

APHA (2012) Standard Methods for the Examination of Water and Wastewater. 22nd Edition. Prepared and published jointly by: APHA, AWWA, and WEF.

Commonwealth of Virginia, 2011. Virginia Water Quality Standards, 9 VAC 25-260. State Water Control Board.

US Environmental Protection Agency (1995). 1995 Updates: Water Quality Criteria Documents for the Protection of Aquatic Life in Ambient Water. EPA 820-B-96-001. Office of Water, Washington, D.C.

US Environmental Protection Agency (1996). The Metals Translator: Guidance for Calculating a Total Recoverable Permit Limit from a Dissolved Criterion. EPA 823-B-96-007. Office of Water, Washington, D.C.

US Environmental Protection Agency (2009). National Recommended Water Quality Criteria: 2009. Office of Water, Washington, D.C.

Westernik, Anna (DEQ)

From: Stewart, Roger (DEQ)
Sent: Thursday, July 09, 2015 12:46 PM
To: Westernik, Anna (DEQ)
Cc: Barron, Alex (DEQ)
Subject: RE: Louisa Regional Zinc Translator

Hello Anna,

I have reviewed the Metal Translator for Zinc, June 2015, results from the Louisa Regional Zinc Translator study report. Although there was an unusually high Total Zinc equipment blank collected at the final effluent the study results and final CT of 0.94 are acceptable.

roger

From: Westernik, Anna (DEQ)
Sent: Thursday, July 09, 2015 10:32 AM
To: Stewart, Roger (DEQ)
Subject: FW: Louisa Regional Zinc Translator

Roger,

Attached is the translator study.

Anna

From: Beth Thompson [mailto:bthompson@shealyconsulting.net]
Sent: Monday, June 15, 2015 1:56 PM
To: Westernik, Anna (DEQ)
Cc: Basore Wesley
Subject: Louisa Regional Zinc Translator

Anna,
Attached is the report for the Louisa Regional Zinc Translator study. I will be happy to send bound copies; please let me know how many you need. Thank you!

Warmest Regards,

Beth

Elizabeth Thompson
Technical Director

Shealy Consulting, LLC.
603 South Lake Drive
Lexington, SC 29072
(803)447-8471 – Cell
(803)808-3113 Ext 201 – Office

LISTING OF DISCHARGERS WITH WASTE LOAD ALLOCATIONS (WLAs) AND DELIVERED ALLOCATIONS (DAs)

York River Basin – Total Nitrogen

Facility	Individual VPDES Permit No.	General Permit Registration No.	General Permit Outfall No.	Design Flow (MGD)	Discharged TN Wasteload Allocation (lbs/yr)	TN Delivery Factor	Delivered TN Wasteload Allocation (lbs/yr)	Limit Effective Date	Basis for Limits	Changes to WQMP Allocations (see footnotes)
Caroline Co. Regional STP	VA0073504	VAN030045	500	0.50	9,137	0.42	3,837	1/1/2012	A	
Caroline Co. Regional STP	VA0073504	VAN030045	500	1.50	9,137	0.42	3,837		A	
Caroline Co. Regional STP	VA0073504	VAN030045	500	3.00	9,137	0.42	3,837		A	
Gordonsville STP	VA0021105	VAN030046	500	0.94	17,177	0.01	172	1/1/2012	A	
Hanover County Aggregate	--	VAN030051	500	--	--	--	210,692	1/1/2012	A	
Ashland WWTP	VA0024899	--	501	2.00	36,547	0.51	18,639	--	A	
Doswell WWTP	VA0029521	--	502	1.00	18,273	0.51	9,319	--	A	
Totopotomoy WWTP	VA0089915	--	503	10.00	182,734	1.00	182,734	--	A	
Bear Island Paper Company	VA0029521	VAN030133	500	4.20	47,328	0.51	24,137	1/1/2012	A	
Plains Marketing, L.P. - Yorktown	VA0003018	VAN030047	500	53.80	167,128	1.00	167,128	1/1/2012	A	
HRSD York River Aggregate	--	VAN030052	500	--	--	--	288,315	1/1/2012		
York River STP	VA0081311	--	501	15.00	275,927	1.00	275,927	--	A	(2)
West Point STP	VA0075434	--	502	0.60	10,964	1.00	10,964	--	A	
King William STP	VA0088102	--	504	0.025	1,424	1.00	1,424	--	B	
Parham Landing WWTP	VA0088331	VAN030048	500	2.00	36,547	1.00	36,547	1/1/2012	A	
RockTenn CP LLC – West Point	VA0003115	VAN030049	500	23.00	259,177	1.00	259,177	1/1/2012	A	
Lake Land' Or WWTP	VA0060887	VAN030110	500	0.22	5,695	0.42	2,392	1/1/2012	B	
Shenandoah Crossing STP	VA0076678	VAN030119	500	0.10	2,848	0.51	1,452	1/1/2012	B	
Louisa Co. Water Authority Aggregate	--	VAN030154	500	--	--	--	14,522	1/1/2015		
Louisa Regional WWTP	VA0067954		501	0.80	22,780	0.51	11,618		B	
Zion Crossroads WWTP	VA0090743		502	0.311	5,695	0.51	2,904		B	
Zion Crossroads WWTP	VA0090743		502	0.70	5,695	0.51	2,904		B	
Lake Anna Environmental Services STP	VA0072079	VAN030146	500	0.099	1,139	0.02	23	(1)	B	
Woodford Estates MHC WWTP	VA0061409	VAN030156	500	0.04	1,424	0.43	612	(1)	B	
York River Basin Totals	--	--	--	--	**1,101,944**	--	**1,009,006**	--	--	--

Attachment 13

Basis for Limits codes (these represent the original basis of the facility WLA and do not reflect trades, netting or bioavailability considerations)

A = WQMP regulation (9 VAC 25-720).
B = Permitted design capacity.
C = New facility, loading limit of zero.

Footnotes

(1) For new facilities that have not previously discharged, the allocation is effective upon issuance of a Certificate to Operate. For expanding facilities, the allocation is effective as of January 1 of the calendar year immediately following the year in which a Certificate to Operate (or equivalent industrial activity) was issued at the design flow listed above.
(2) York River STP wasteload allocation reflects the consolidation of the Mathews Courthouse STP.

LISTING OF DISCHARGERS WITH WASTE LOAD ALLOCATIONS (WLAs) AND DELIVERED ALLOCATIONS (DAs)

York River Basin – Total Phosphorus

Facility	Individual VPDES Permit No.	General Permit Registration No.	General Permit Outfall No.	Design Flow (MGD)	Discharged TP Wasteload Allocation (lbs/yr)	TP Delivery Factor	Delivered TP Wasteload Allocation (lbs/yr)	Limit Effective Date	Basis for Limits	Changes to WQMP Allocations (see footnotes)
Caroline Co. Regional STP	VA0073504	VAN030045	500	0.50	1,066	0.44	469	1/1/2012	A	
Caroline Co. Regional STP	VA0073504	VAN030045	500	1.50	1,066	0.44	469		A	
Caroline Co. Regional STP	VA0073504	VAN030045	500	3.00	1,066	0.44	469		A	
Gordonsville STP	VA0021105	VAN030046	500	0.94	2,004	0.60	1,202	1/1/2012	A	
Hanover County Aggregate	--	VAN030051	500	--	--	--	25,156	1/1/2012		
Ashland WWTP	VA0024899	--	501	2.00	4,264	0.60	2,558	--	A	
Doswell WWTP	VA0029521	--	502	1.00	2,132	0.60	1,279	--	A	
Totopotomoy WWTP	VA0089915	--	503	10.00	21,319	1.00	21,319	--	A	
Bear Island Paper Company	VA0029521	VAN030133	500	4.20	12,791	0.60	7,675	1/1/2012	A	
Plains Marketing, L.P. - Yorktown	VA0003018	VAN030047	500	53.80	22,111	1.00	22,111	1/1/2012	A	
HRSD York River Aggregate	--	VAN030052	500	--	--	--	33,660	1/1/2012		
York River STP	VA0081311	--	501	15.00	32,191	1.00	32,191	--	A	(2)
West Point STP	VA0075434	--	502	0.60	1,279	1.00	1,279	--	A	
King William STP	VA0088102	--	504	0.025	190	1.00	190	--	B	
Parham Landing WWTP	VA0088331	VAN030048	500	2.00	4,264	1.00	4,264	1/1/2012	A	
RockTenn CP LLC - West Point	VA0003115	VAN030049	500	23.00	56,038	1.00	56,038	1/1/2012	A	
Lake Land' Or WWTP	VA0060887	VAN030110	500	0.22	761	0.45	343	1/1/2012	B	
Shenandoah Crossing STP	VA0076678	VAN030119	500	0.10	381	0.60	229	1/1/2012	B	
Louisa Co. Water Authority Aggregate	--	VAN030154	500	--	--	--	2,192	1/1/2015		
Louisa Regional WWTP	VA0067954		501	0.80	3,045	0.60	1,827		B	
Zion Crossroads WWTP	VA0090743		502	0.311	609	0.60	365		B	
Zion Crossroads WWTP	VA0090743		502	0.70	609	0.60	365		B	
Lake Anna Environmental Services STP	VA0072079	VAN030146	500	0.099	152	0.60	91	(1)	B	
Woodford Estates MHC WWTP	VA0061409	VAN030156	500	0.04	190	0.45	86	(1)	B	
York River Basin Totals	--	--	--	--	**164,787**	--	**153,516**	--	--	--

Basis for Limits codes (these represent the original basis of the facility WLA and do not reflect trades, netting or bioavailability considerations)

A = WQMP regulation (9 VAC 25-720).
B = Permitted design capacity.

Footnotes

(1) For new facilities that have not previously discharged, the allocation is effective upon issuance of a Certificate to Operate. For expanding facilities, the allocation is effective as of January 1 of the calendar year immediately following the year in which a Certificate to Operate (or equivalent industrial activity) was issued at the design flow listed above.
(2) York River STP wasteload allocation reflects the consolidation of the Mathews Courthouse STP.

BASIS FOR CONVENTIONAL POLLUTANT EFFLUENT LIMITS - 0.40 MGD FACILITY

~~These limits (10 mg/l CBOD$_5$, 30 mg/l TSS, 6.0 mg/l D.O.)~~ were established based on the site inspection report dated July 21, 1994 and a memo entitled "Dry Ditch Discharges and Other Waters Not Easily Modeled" (2/17/95) from Larry Lawson, P.E. and Alan Anthony, Ph.D. to Frank Daniel. Attached to the memo is another memo entitled "Permit Limits for Waters not Easily Modelable" (1/20/95) which describes the effluent limits required for swamps or marshes. The site inspection report dated 07/24/94 from Lisa Buffin, verified the "swamp-like" nature of Beaver Creek about a quarter to one-half mile downstream of the discharge due to obstructions caused by beaver activity. The 1/20/95 memo did not indicate a required TSS limit so the federal effluent requirement of 30 mg/l will still apply.

Ammonia limits are calculated based on a 100% complete mix assumption (see attached correspondence between Lisa Buffin and Dale Phillips). Beaver Creek is not "swamp like" at the point of discharge and thus a "mixing zone" was allowed for Ammonia. The Ammonia limits for the 0.4 MGD facility are further detailed in Attachment E of this Statement of Basis. A new evaluation of data indicates that ammonia limitations could be increased; however, since TKN must be controlled at 3.0 mg/l or less, backsliding prevents this from being implemented. The monthly maximum limitation has changed to weekly average; however, this represents the same statistical evaluation of information. The permittee has been meeting existing ammonia limitations.

Antidegradation Status: The receiving stream in the vicinity of the subject discharge has been evaluated in accordance with OWRM Guidance Memo No. 93-015. This permit action does not involve a new discharge or an increase in flow from an existing discharge. Consequently, non further evaluation is necessary.

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY

Valley Regional Office

116 North Main Street P. O. Box 268 Bridgewater, VA 22812

SUBJECT: Inspection of Beaver Creek
Louisa Regional STP Discharge
VPDES Permit No. VA0067954 - Louisa County

TO: VRO File

FROM: Lisa Buffin - VRO, DEQ LB

DATE: 07/21/94

COPIES: B. K. Fowler, L. M. Simmons

On July 8, 1994, Keith Fowler and I inspected Beaver Creek to ascertain the need for stream monitoring as required by the current Louisa Regional STP permit. The permit requires that a plan be developed to identify the parameters and monitoring locations necessary to verify that the oxygen demanding pollutants being discharged by Louisa Regional STP are not impacting Beaver Creek. Mr. H. Barlow Delk, the General Manager of the Louisa County Water Authority, disputed the need for stream monitoring because of the alleged naturally low dissolved oxygen (D.O.) in the creek. Mr. Delk and Mr. David Jones (operator) were present at the inspection.

Beaver Creek has a 7Q10 flow of 0.008 MGD. Tanyard Creek flows through a section of golf course and then enters Beaver Creek just below the discharge. Icepond Creek subsequently enters Beaver Creek on the opposite side. Filamentous algae were present in both Beaver Creek just downstream of this junction and Tanyard Creek upstream. After its confluence with Tanyard Creek and Icepond Creek, Beaver Creek flows through a very small section of golf course and then enters a wooded area where beaver activity is evident. Although Beaver Creek is a defined channel, the site inspection confirmed that it is not modelable since there are significant flow obstructions due to the beaver activity. Historical data also exist regarding the presence of beaver dams and other obstructions (DSWI memo dated 12/16/82).

Although the 1984 permit had a stream monitoring requirement, it was never implemented due to STP performance problems (fact sheet, 1989 permit). Monitoring data were first submitted in June of 1989. The data from June 1989 to November 1989 indicate a lower average D.O. concentration upstream than downstream. Two upstream D.O. concentrations (3.9 mg/L daily average, 3.8 mg/L minimum) and none of the downstream concentrations violated the Water Quality

Standards (WQS) during this period. (WQS = 5.0 mg/L daily average, 4.0 mg/L minimum). These data are summarized on the attached page. The 03/29/89 permit required only downstream D.O. monitoring between April and October. Thus, no upstream data are available for comparison after November 1989. Downstream data indicate several D.O. violations. These data (04/05/90-05/30/94) are summarized as follows:

Violations of WQS Minimum Concentration

07/22/91	10:45 am	3.8 mg/L
09/16/91	11:00 am	3.0 mg/L
10/28/91	11:15 am	3.4 mg/L
10/25/93	11:00 am	3.3 mg/L

Violations of WQS Daily Average Concentration

07/15/91	11:45 am	4.2 mg/L
	4:15 pm	4.2 mg/L
	Average	4.2 mg/L
09/16/91	11:00 am	3.0 mg/L
	3:45 pm	5.6 mg/L
	Average	4.3 mg/L
10/28/91	11:15 am	3.4 mg/L
	3:35 pm	4.5 mg/L
	Average	4.0 mg/L
10/25/93	11:00 am	3.3 mg/L
	4:15 pm	5.6 mg/L
	Average	4.4 mg/L

The site inspection supported the conclusion stated in the 1993 fact sheet that the STP does not appear to be exacerbating the occasional downstream D.O. violations. The low D.O.s and the D.O. fluctuations could result from the beaver impoundments and naturally low velocity conditions; algal activity; and organic and nutrient inputs from leaves and runoff, as well as the STP discharge. The STP is possibly contributing a higher BOD load than any other source, although the average effluent cBOD concentration from January 1990 through June 1994 is 4.7 mg/L (range = 2.1 mg/L - 10 mg/L). There were no effluent D.O. violations (permit limit = 6.0 mg/L) during this period. The high quality of the effluent data and the proximity of the downstream monitoring station provide very strong indications that the problem is not the BOD and D.O. concentrations of the effluent. Other D.O. demands on the stream

could include resident algae (there possibly from nutrient enriched conditions) and settled organic matter.

From the inspection and the data available, the actual source of the low D.O. concentrations has yet to be determined. It is recommended that the STP conduct downstream monitoring of Beaver Creek with control stations upstream in Beaver Creek, Tanyard Creek and Icepond Creek in order to exclude itself as the possible source.

Plans for STP expansion are underway. Based on the current quality of the receiving stream and the unmodelable condition downstream, we plan to assign "swamp limits" (10 mg/L cBOD, 10 mg/L TSS, 3 mg/L TKN) to any proposed expansion unless an approvable model is submitted by the permittee to indicate that alternative limits would protect downstream water quality.

Average Daily Concentrations of Temperature and Dissolved Oxygen
BEAVER CREEK - Upstream and Downstream of Discharge Point

	UPSTREAM		DOWNSTREAM	
DATE	T (degC)	DO (mg/L)	T (degC)	DO (mg/L)
6/17/89	20	7.3	17.5	7.9
6/24/89	22	7.2	22	7.4
7/1/89	20.3	7.6	21.5	7.2
7/8/89	24.5	7.8	23.5	7
7/14/89	25	6.1	23.5	6.9
7/21/89	24	6.5	24	6.9
7/28/89	27.5	6.1	25	6.7
8/4/89	26.5	8.1	25	6.8
8/10/89	19	6.9	20.5	7.2
8/18/89	20.5	6.6	20.5	6.8
8/24/89	25	3.9	24.5	7.1
9/1/89	20.5	5.4	23	7.2
9/7/89	20.5	7.2	22	7.3
9/14/89	23	5.1	23	7.1
9/28/89	21.5	5.8	22	7
10/5/89	18.5	6.7	18.5	6.8
10/13/89	16	7.7	18	7.6
10/26/89	15	9	15.5	8.9
11/10/89	15	9.5	15.5	9.5
11/17/89	14	9.1	14	9
11/24/89	14	9.3	14.5	9

LL

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY

116 North Main Street P. O. Box 268 Bridgewater, VA 228

SUBJECT: MIX.EXE Program - Louisa Regional STP Permit Modification
VPDES Permit No. VA0067954

TO: Dale Phillips

FROM: Lisa Buffin LB

DATE: 05/19/95

COPIES: File

Per my telephone call to you today, here are the specifications whic
were entered into the MIX.EXE program for the above referenced
facility:

Name of Discharger:	Louisa Regional STP
7Q10 stream flow:	0.0078 MGD
1Q10 stream flow:	0.0065 MGD
Effluent flow:	0.20 MGD (existing)
	0.40 MGD (proposed)
Stream slope:	0.005 ft/ft
Stream width:	1 foot
Stream roughness:	2
Meandering:	1 (until confluence w/Tanyard Branch)

I have attached the MIX.EXE result. These estimated values are only applicable to Beaver Creek at the point of discharge. I inspected th stream in July of 1994. Please note that two other streams (Tanyard Branch and Icepond) enter immediately below the point of discharge. The stream then becomes unmodelable/swamplike downstream due to beave activity.

I have encountered this problem before with a similar stream (one wit very low 7Q10 flow). Could you please explain what is occurring?

It appears that the flow from this facility entering such a small stream would result in a 100% complete mix. Please review this information and provide me with your comments (by FAX if possible) at your earliest convenience so that I may continue permit processing. Thanks.

The specifications you have entered leads to a stream that is too narrow and deep for this program to estimate mixing, e.g. The width is less than 10 times the depth

Check your input data and if it is correct, contact Dale Phillips in OWRM (527-5076) for assistance

C:\MENU\MIX>

COMMONWEALTH OF VIRGINIA
DEPARTMENT OF ENVIRONMENTAL QUALITY
Water Division
4900 Cox Road P.O.Box 10009 Glen Allen, Virginia 23240

MEMORANDUM

Subject: Louisa Mixing

To: Lisa Buffin

From: M. Dale Phillips Dale

Date: May 22, 1995

Copies:

There is no problem with your analysis. I am familiar with the stream in question and your inputs are O.K. The results you experienced are due to the assumptions made during development of the program. It was assumed that streams would be wide relative to their depth and the program uses a ratio of 10:1 to check this assumption. In this case, the program, appropriately, found that the width is less than 10 times the depth and did not run, I agree that this accurate for this stream. I do not have a model that will provide a reasonable prediction for this extremely small stream.

Regarding this particular situation, mixing assumptions should not make a significant difference because the stream flow is so low compared to the effluent that the effluent will have to meet or be extremely close to the applicable standards at the pipe end.

Based on my personal knowledge of the stream and the discharge in question, I would recommend that you apply a complete mix assumption to evaluate this discharge.

Relative to your general question about small streams, recall that this model neglects initial mixing. This means that no hydraulic distinction is made between the two streams and mixing is due entirely to ambient turbulence. The result of this treatment is that it will require the same distance for a small stream to mix with a large effluent as required for a small effluent to mix with a large stream.

This may lead to relatively large errors in estimating mixing distances where the stream's flow is very, very small. However, the error will probably not be any larger than estimates of velocity and flow in these streams.

In general, the WLA should not be significantly wrong due to these errors because of the general unimportance of mixing in these very small streams. If the impact does become significant, then it is often easy to sufficiently demonstrate the actual mixing in these streams with a few milliliters of dye and visual observation.

Public Notice – Environmental Permit

PURPOSE OF NOTICE: To seek public comment on a draft permit from the Department of Environmental Quality that will allow the release of treated wastewater into a water body in Louisa County Virginia.

PUBLIC COMMENT PERIOD: October 29, 2015 – November 30, 2015

PERMIT NAME: Virginia Pollutant Discharge Elimination System Permit – Wastewater issued by DEQ, under the authority of the State Water Control Board

APPLICANT NAME, ADDRESS AND PERMIT NUMBER: Town of Louisa and County of Louisa
P.O. Box 9
Louisa, VA 23093
VA0067954

NAME AND ADDRESS OF FACILITY: Louisa Regional Sewage Treatment Plant, 131 Pine Ridge Drive
Louisa, VA 23093

PROJECT DESCRIPTION: The Louisa County Board of Supervisors has applied for a reissuance of a permit for the public Louisa Regional Sewage Treatment Plant. The applicant proposes to release treated sewage wastewaters from residential, commercial, and industrial areas at a rate of 0.8 million gallons per day into a water body. Biosolids from the treatment process will be land applied by the owner. The facility proposes to release the treated sewage into the Beaver Creek, located in Louisa County in the York River Watershed. A watershed is the land area drained by a river and its incoming streams. The permit will limit the following pollutants to amounts that protect water quality: pH, Carbonaceous-Biochemical Oxygen Demand, Total Suspended Solids, Dissolved Oxygen, Ammonia as Nitrogen, *E. coli*, Total Nitrogen, and Total Phosphorus. The facility will be required to monitor for Total Kjeldahl Nitrogen, Nitrate+Nitrite, Total Recoverable Zinc, Total Hardness, and Whole Effluent Toxicity.

PRETREATMENT PROGRAM: The facility maintains a pretreatment program in accordance with Part VII of 9VAC25-31. An Industrial Pretreatment Plan for maintaining a Continuous Industrial Waste Survey has been established.

WATER EFFECT RATIO (WER) STUDY: The Louisa County Water Authority conducted a study to develop a site-specific WER Study for the purpose of applying the copper water quality criteria as defined in 9 VAC25-260-140(B).

CHEMICAL TRANSLATOR STUDY: The Louisa County Water Authority conducted a chemical translator study to determine the bioavailable fraction of zinc to be used to evaluate toxicity.

NUTRIENT DISCHARGE: This facility is subject to the requirements of 9VAC25-820 and has registered for coverage under the General VPDES Watershed Permit Regulation for Total Nitrogen and Total Phosphorus Discharges and Nutrient Trading in the Chesapeake Watershed in Virginia.

HOW TO COMMENT AND/OR REQUEST A PUBLIC HEARING: DEQ accepts comments and requests for public hearing by hand-delivery, email, fax or postal mail. All comments and requests must be in writing and be received by DEQ during the comment period. Submittals must include the names, mailing addresses and telephone numbers of the commenter/requester and of all persons represented by the commenter/requester. A request for public hearing must also include: 1) The reason why a public hearing is requested. 2) A brief, informal statement regarding the nature and extent of the interest of the requester or of those represented by the requester, including how and to what extent such interest would be directly and adversely affected by the permit. 3) Specific references, where possible, to terms and conditions of the permit with suggested revisions. A public hearing may be held, including another comment period, if public response is significant, based on individual requests for a public hearing, and there are substantial, disputed issues relevant to the permit.

CONTACT FOR PUBLIC COMMENTS, DOCUMENT REQUESTS AND ADDITIONAL INFORMATION: The public may review the draft permit and application at the DEQ-Northern Regional Office by appointment or may request electronic copies of the draft permit and fact sheet.

Name: Anna Westernik
Address: DEQ-Northern Regional Office, 13901 Crown Court, Woodbridge, VA 22193
Phone: (703) 583-3837 Email: anna.westernik@deq.virginia.gov Fax: (703) 583-3821

Attachment 15

APPENDIX A
SCHEDULE OF COMPLIANCE

Louisa County Water Authority (LCWA) shall:

1. Evaluate and update the Louisa County Water Authority laboratory Standard Operating Procedures (SOPs) to include all current laboratory procedures, QA/QC, Standard Method Requirements, and a laboratory training program. The SOPs for the analysis of those parameters that are currently performed in-house, shall be submitted to DEQ by December 31, 2010, for review and approval. Once approved by DEQ, the SOPs shall be incorporated into the Louisa Regional and Zion Crossroads O&M Manuals. Prior to engaging in any future in-house laboratory analysis, SOPs shall be submitted to DEQ for review and approval.

2. Beginning November 1, 2010, keep a detailed log of all Plant maintenance including how often the Ultra Violet (UV) system is cleaned. This log shall be kept up to date and maintained on site for DEQ review.

3. Submit to DEQ for review and approval by January 31, 2011, a plan and schedule detailing the steps LCWA shall take to obtain an approvable pretreatment program. Said plan and schedule shall include all elements required by 9 VAC Part VII, and VPDES Permit VA0067954 Part I D.3, to develop an approvable pre-treatment program and shall include, but not be limited to the following requirements:

    A. Local limits, including a spreadsheet showing all calculations, and a comprehensive narrative explaining how the local limits were derived;
    B. A revised Sewer Use Ordinance and an Enforcement Response Plan;
    C. Inter-jurisdictional agreements for the pretreatment program for the Towns of Mineral and Louisa.

    Any comments provided to LCWA regarding the aforementioned submittal shall be addressed by LCWA to DEQ in writing within 30 days of receipt of comments. Once approved by DEQ, the aforementioned plan and schedule shall become an enforceable part of this Order.

4. Submit a plan and schedule to DEQ for review and approval by January 31, 2011, detailing the measures that LCWA will take to meet permitted zinc limits, including an evaluation of the current temporary chemical addition system. Once approved by DEQ, said plan and schedule shall be implemented by LCWA and shall become enforceable under this Order.

5. Submit completed Chain of Custody and Certificate of Analysis forms and any applicable bench sheets for compliance samples with each monthly DMR to DEQ for the life of this Order.

6. Documents to be submitted to the Department, other than the civil charge payment described In Section D of this Order, shall be sent to:
    Department of Environmental Quality
    Northern Regional Office

Attn: Enforcement
13901 Crown Court
Woodbridge, VA 22193